1. Given the statement:
In five trading days, the stock price rose $2.90.
Choose the sentence that best expresses how rapidly, on average, the quantity has changed over the given interval.

A) The stock price increased by an average rate of $1.72 per day.
B) The stock price increased by an average rate of $0.58 per day.
C) The stock price increased by an average rate of $1.45 per day.
D) The stock price increased by an average rate of $2.90 per day.
E) The stock price increased by an average rate of $5.00 per day.

Ans: B
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-4
Learning Objective: Understand rates of change
Section: 2.1
Similar to Exercise: 2.1.1
Type: Concept

2. The function *f* gives the weekly profit, in thousand dollars, that an airline makes on its flights from Boston to Washington D.C. when the ticket price is *p* dollars. Choose the sentence that best expresses
$f'(100) = -3$.

A) When the ticket price is $100, the weekly profit to the airline on flights from Boston to Washington is increasing by $3 thousand per dollar (of ticket price).
B) When the ticket price is $3, the weekly profit to the airline on flights from Boston to Washington is decreasing by $100 thousand per dollar (of ticket price).
C) When the ticket price is $3, the weekly profit to the airline on flights from Boston to Washington is increasing by $100 thousand per dollar (of ticket price).
D) When the ticket price is $100, the weekly profit to the airline on flights from Boston to Washington is decreasing by $3 thousand per dollar (of ticket price).
E) When the ticket price is $100, the weekly profit to the airline on flights from Boston to Washington is decreasing by $100 thousand per dollar (of ticket price).

Ans: D
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 3
Learning Objective: Understand rates of change
Section: 2.1
Similar to Exercise: 2.1.3c
Type: Concept

3. Given the statement:
The company lost $15,000 during the past 5 months.
Choose the sentence that best expresses how rapidly, on average, the quantity has changed over the given interval.

A) The company lost on average $15,000 per month.
B) The company lost on average $75,000 per month.
C) The company lost on average $7,500 per month.
D) The company lost on average $8,000 per month.
E) The company lost on average $3,000 per month.

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-4
Learning Objective: Understand rates of change
Section: 2.1
Similar to Exercise: 2.1.4
Type: Concept

4. An Airline industry posted a profit of $17.8 million at the end of 2009 compared with a loss of $121.7 million in 2008. Calculate change.

A) $139.5 million
B) $121.7 million
C) $103.9 million
D) $69.8 million
E) $121.7 million

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 5-8
Learning Objective: Calculate change
Section: 2.1
Similar to Exercise: 2.1.5a
Type: Application

5. The percentage of students meeting national mathematics benchmarks on the ACT increased from 39% in 2001 to 42% in 2010. Calculate the average rate of change. Round your answer to two decimal places.

A) 0.23 percentage points per year
B) 0.33 percentage points per year
C) 0.99 percentage points per year
D) 0.08 percentage points per year
E) 3.20 percentage points per year

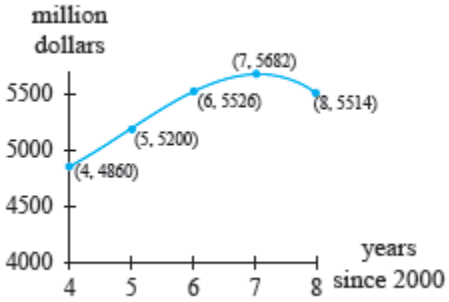
Ans: B
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 5-8
Learning Objective: Calculate average rate of change
Section: 2.1
Similar to Exercise: 2.1.7c
Type: Application

6. The population in a certain country was 364 thousand in 1930 and 3.5 million in 2005. Calculate the percentage change. Round your answer to one decimal place.

A) 86.2%
B) 861.5%
C) 313.6%
D) 11.6%
E) 1.2%

Ans: B
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 5-8
Learning Objective: Calculate and write a sentence interpreting percentage change
Section: 2.1
Similar to Exercise: 2.1.8b
Type: Application

7. A graph of a model for the sales of services between 2004 and 2008 by Kelly Services, Inc., a leading global provider of staffing services, is shown below.

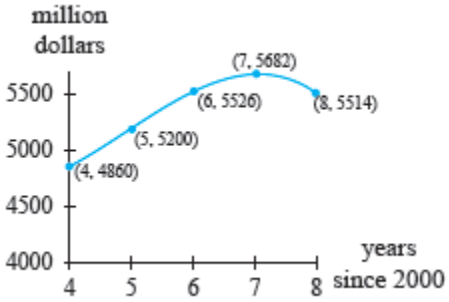


Use the graph to calculate the average rate of change in Kelly's sales of services between 2005 and 2007.

A) 241 million dollars per year
B) 274 million dollars per year
C) 5500 million dollars per year
D) 550 million dollars per year
E) 5 million dollars per year

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 11
Learning Objective: Calculate the average rate of change
Section: 2.1
Similar to Exercise: 2.1.11a
Type: Application

8. A graph of a model for the sales of services between 2004 and 2008 by Kelly Services, Inc., a leading global provider of staffing services, is shown below.

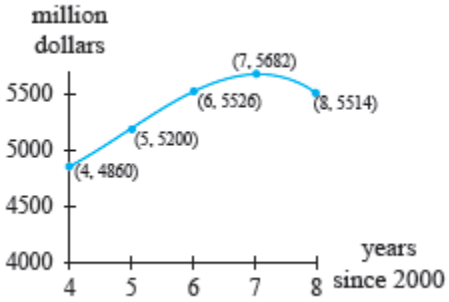


Calculate the percentage change in Kelly's sales between 2006 and 2007.

A) increased by 2.823%.
B) decreased by 2.823%.
C) increased by 2.746%.
D) decreased by 0.028%.
E) increased by 0.028%.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 11
Learning Objective: Calculate the percentage change
Section: 2.1
Similar to Exercise: 2.1.11b
Type: Application

9. A graph of a model for the sales of services between 2004 and 2008 by Kelly Services, Inc., a leading global provider of staffing services, is shown below.



Calculate the percentage change in Kelly's sales between 2004 and 2007.

A) $822 million
B) $4860 million
C) $411 million
D) $10542 million
E) $5271 million

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 11
Learning Objective: Calculate the percentage change
Section: 2.1
Similar to Exercise: 2.1.11c
Type: Application

10. Calculate the average rate of change in disposable personal income between 1995 and 2000. Round your answer to the nearest dollar.

Year	Disposable Personal Income (dollars per person)
1990	10,955
1995	15,741
1997	21,531
1999	22,543
2000	27,693

A) 2390 dollars per person per year
B) 1195 dollars per person per year
C) 3348 dollars per person per year
D) 5150 dollars per person per year
E) 1030 dollars per person per year
Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 13
Learning Objective: Average Rate of Change of a Data Set
Section: 2.1
Similar to Exercise: 2.1.13
Type: Application

11. 99.2% of ATMs levy a surcharge on users who are not account holders. The amount of the surcharge for non-account holders can be modeled as

$s(t) = 0.73\left(1.084^t\right)$ dollars

where *t* is the number of years since 1995, data from $3 \le t \le 13$. Calculate the percentage change in the amount of the surcharge for non-account holders between 1998 and 2008. Round your answer to nearest three decimals.

A) 124.023%
B) 224.023%
C) 44.638%
D) 108.400%
E) 115.322%

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 19
Learning Objective: Calculate the percentage change
Section: 2.1
Similar to Exercise: 2.1.19b
Type: Application

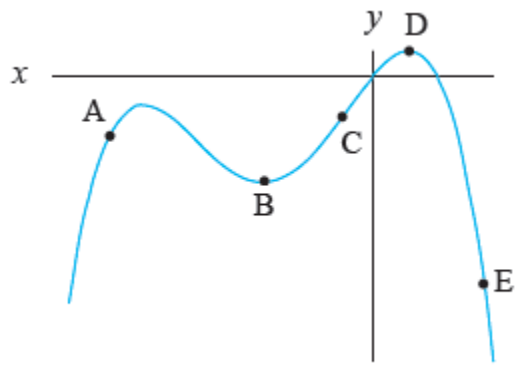
12. Calculate the average rate of change of the function over the given interval. Round your answer to two decimal places.

$f(x) = 5x - 8$ over the interval $[1, 8]$

A) –4.14
B) –5.00
C) 3.89
D) 4.14
E) 5.00

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 21
Learning Objective: Average Rate of Change of a Function
Section: 2.1
Similar to Exercise: 2.1.21
Type: Skill

13. Use the figure to answer the questions.

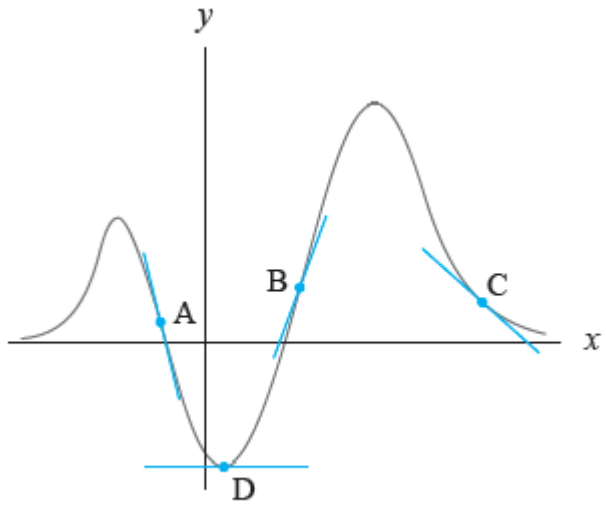


Is the graph steeper at point C or at point E?

A) E
B) D
C) B
D) A
E) C

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-4
Learning Objective: Which is the steepest point
Section: 2.2
Similar to Exercise: 2.2.1b
Type: Concept

14. Identify which points have lines drawn through them that are not tangent to the graph.



A) A and B
B) B and C
C) A and D
D) B and D
E) A and C
Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 15-16
Learning Objective: Identify the points of tangent
Section: 2.2
Similar to Exercise: 2.2.15
Type: Concept

15. The function *p* gives the number of meters from an airport that a plane has flown after *t* minutes. What are the units on $p'(2.5)$.

A) kilometers per minute
B) meters per hour
C) meters per minute
D) kilometers per hour
E) minutes per meter
Ans: C
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1
Learning Objective: Find the units
Section: 2.3
Similar to Exercise: 2.3.1a
Type: Concept

16. The function *B* gives the balance, in dollars, in a mutual fund *t* years after the initial investment. Assume that no deposits or withdrawals are made during the investment period.
What is the financial interpretation of $B'(12)$.

A) interest rate
B) interest value
C) fixed rate
D) floating rate
E) simple interest
Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 2
Learning Objective: Find the financial interpretation
Section: 2.3
Similar to Exercise: 2.3.2b
Type: Application

17. The function *w* gives the number of words per minute (wpm) that a student in a keyboard class can type after *t* weeks in the course.

Is it possible for $\left.\frac{dw}{dt}\right|_{t=5}$ to be negative? Explain.

A) $\left.\frac{dw}{dt}\right|_{t=5}$ can be negative if the number of words typed per minute is decreasing at week 5.

B) $\left.\frac{dw}{dt}\right|_{t=5}$ can be negative if the number of words typed per minute is increasing at week 5.

C) $\left.\frac{dw}{dt}\right|_{t=5}$ can be negative if the number of words typed per minute is decreasing at day 5.

D) $\left.\frac{dw}{dt}\right|_{t=5}$ can be negative if the number of words typed per minute is increasing at day 5

E) $\left.\frac{dw}{dt}\right|_{t=5}$ cannot be negative because the lowest number of words typed in a minute is 5 .

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 5
Learning Objective: Is it possible for the given derivative to be negative
Section: 2.3
Similar to Exercise: 2.3.5c
Type: Concept

18. The function *P* gives the profit in dollars that a fraternity makes selling *x* T-shirts. Is it possible for $P(80)$ to be negative? Explain.

A) $P(80)$ can be negative if the cost of the 80 shirts is greater than the revenue from the sales of 80 shirts.

B) $P(80)$ can be negative if the cost of the 80 shirts is less than the revenue from the sales of 80 shirts.

C) $P(80)$ can be negative if the cost of the 80 shirts is greater than or equal to the revenue from the sales of 80 shirts.

D) $P(80)$ cannot be negative as the cost of the 80 shirts is less than the revenue from the sales of 80 shirts.

E) $P(80)$ cannot be negative as the cost of the 80 shirts is greater than the revenue from the sales of 80 shirts.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 7
Learning Objective: Explain the given function
Section: 2.3
Similar to Exercise: 2.3.7a
Type: Concept

19. The function g gives the fuel efficiency, in miles per gallon, of a car traveling v miles per hour. Write a sentence of interpretation for the following statement.
$g'(35) = 0.25$ and $g'(52) = 0$.

A) The fuel efficiency of a car traveling 35 is increasing by 0.25 mpg per mph. The fuel efficiency is neither increasing nor decreasing for a car traveling 52 mph.

B) The fuel efficiency of a car traveling 52 is increasing by 0.25 mpg per mph. The fuel efficiency is neither increasing nor decreasing for a car traveling 35 mph.

C) The fuel efficiency of a car traveling 35 is increasing by 0.25 mpg per mph. The fuel efficiency is increasing for a car traveling 52 mph.

D) The fuel efficiency of a car traveling 35 is increasing by 0.25 mpg per mph. The fuel efficiency is decreasing for a car traveling 52 mph.

E) The fuel efficiency of a car traveling 35 is increasing by 0.25 mpg per mph. The fuel efficiency is increasing or decreasing for a car traveling 35 mph.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 12
Learning Objective: Write a sentence of interpretation for the equation
Section: 2.3
Similar to Exercise: 2.3.12b
Type: Concept

20. The function D gives the time, in years, that it takes for an investment to double if interest is continuously compounded at r%. Write a sentence of interpretation for $D(8) = 7.2$

A) At 8% interest compounded continuously, an investment will double its value in 7.2 years.

B) At 8% interest compounded continuously, an investment will triple its value in 7.2 years.

C) At 8% interest the investment will be same after 7.2 years.

D) At 7.2% interest compounded continuously, an investment will double its value in 8 years.

E) At 7.2% interest compounded continuously, an investment will triple its value in 8 years.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 13
Learning Objective: Write a sentence of interpretation
Section: 2.3
Similar to Exercise: 2.3.13ci
Type: Concept

21. The function D gives the time, in years, that it takes for an investment to double if interest is continuously compounded at r%. Write a sentence of interpretation for $D'(4) = -2.74$

A) If the interest rate for an investment at 4% compounded continuously is changed to 5% compounded continuously, the doubling time will decrease by approximately 2.74 years.

B) If the interest rate for an investment at 4% compounded continuously the doubling time will decrease by approximately 2.74 years.

C) If the interest rate for an investment at 2.74% compounded continuously the doubling time will decrease by approximately 4 years.

D) If the interest rate for an investment at 4% compounded continuously is changed to 5% compounded continuously, the doubling time will increase by approximately 2.74 years.

E) If the interest rate for an investment at 2.74% compounded continuously is changed to 3.74% compounded continuously, the doubling time will increase by approximately 4 years.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 13
Learning Objective: Write a sentence of interpretation
Section: 2.3
Similar to Exercise: 2.3.13cii
Type: Concept

22. The relation u gives the number of people unemployed in a country t months after the election of a new president.

$$\left.\frac{du}{dt}\right|_{t=36} = 800,000$$

Choose the sentence that best expresses $u(t)$ describing the unemployment situation.

A) Three years after the election, the number of people unemployed was decreasing by 800,000 per month.

B) Three years after the election, the number of people unemployed was 800,000 per month.

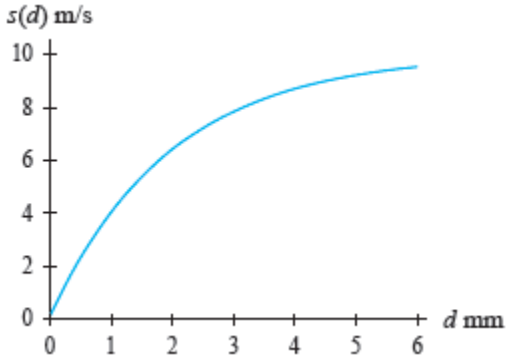
C) Three years after the election, the number of people unemployed was increasing by 36 per month.

D) Three years after the election, the number of people unemployed was decreasing by 36 per month.

E) Three years after the election, the number of people unemployed was increasing by 800,000 per month.

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 14b
Learning Objective: Interpret the fact in statement
Section: 2.3
Similar to Exercise: 2.3.14b
Type: Concept

23. The figure shows the terminal speed, in meters per second, of a raindrop as a function of the size of the drop measured in terms of its diameter.

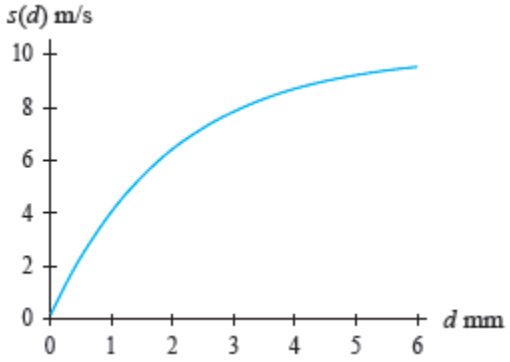


Estimate the slope of secant line connecting the points for diameters of 1 mm and 5 mm.

A) 1.275 m/s per mm
B) 2.217 m/s per mm
C) 3.325 m/s per mm
D) 5 m/s per mm
E) 4 m/s per mm

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 17
Learning Objective: Estimate the slope
Section: 2.3
Similar to Exercise: 2.3.17a
Type: Application

24. The figure shows the terminal speed, in meters per second, of a raindrop as a function of the size of the drop measured in terms of its diameter.



Estimate the derivative of the speed for a diameter of 2 mm.

A) 1.7
B) 3.7
C) 0.3
D) 3.2
E) 4.7

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 17
Learning Objective: Estimate the derivative
Section: 2.3
Similar to Exercise: 2.3.17c
Type: Application

25. Find the slope of the tangent to the graph of $f(x)$ at any point.
$f(x) = 2^x;\ x = 4$ estimate to the nearest tenth

A) 12.6
B) 22.2
C) 12.1
D) 10.1
E) 11.1

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1
Learning Objective: Calculate the slopes of tangent lines
Section: 2.4
Similar to Exercise: 2.4.1
Type: Skill

26. At the indicated x-value, find the slope of the tangent line.
$R(x) = 19x + 7x^2, \ x = 4$

A) 75
B) 245
C) 26
D) 33
E) 47

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-4
Learning Objective: Find the slope of a curve using the Algebraic Method
Section: 2.4
Similar to Exercise: 2.4.2
Type: Skill

27. Find the slope of the tangent to the graph of $f(x)$ at any point.
$f(x) = 4x^2 + 2x$

A) $8x + 2$
B) $8x - 2$
C) $4x + 2$
D) $4x^2 + 2x$
E) $2x$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-4
Learning Objective: Calculate slopes of tangent lines
Section: 2.4
Similar to Exercise: 2.4.3
Type: Skill

28. Find the slope of the tangent at $x = 2$.
$f(x) = 6x^2 + 9x$

A) 15
B) 21
C) 33
D) 42
E) 0

Ans: C
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-4
Learning Objective: Calculate the slope of a tangent line
Section: 2.4
Similar to Exercise: 2.4.4
Type: Skill

29. The future value of a certain savings account with no activity besides compounding of interest is modeled as
$F(t) = 1400\left(1.0406^t\right)$ dollars

where *t* is the number of years since $1400 was invested.
Numerically estimate to the nearest cent the rate of change of the future value when $t = 12$.

A) $89.82 per year
B) $188.08 per year
C) $173.62 per year
D) $18.65 per year
E) $451.40 per year

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Difficult
Exercise Group: 6
Learning Objective: Numerically estimate the rate of change
Section: 2.4
Similar to Exercise: 2.4.6a
Type: Application

30. The future value of a certain savings account with no activity besides compounding of interest is modeled as

$F(t) = 1600\left(1.0405^t\right)$ dollars

where *t* is the number of years since \$1600 was invested.
Calculate the percentage rate of change of the future value when $t = 9$.

A) 3.97% per year
B) 90.80% per year
C) 9.08% per year
D) 25.41% per year
E) 22.87% per year

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Difficult
Exercise Group: 6
Learning Objective: Calculate the percentage rate of change
Section: 2.4
Similar to Exercise: 2.4.6b
Type: Application

31. Suppose the function *G*(*t*) represents a test grade (out of 100 points) as a function of hours studied.
If $G(t) = -0.048t^3 + 0.915t^2 + 38.001$ points, approximate, to one decimal place, the slope of the tangent line when $t = 13$.

A) 87.2 points per hour
B) 3.8 points per hour
C) 21.9 points per hour
D) –0.5 points per hour
E) –7.1 points per hour

Ans: D
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 8
Learning Objective: Calculate the slope of a tangent line
Section: 2.4
Similar to Exercise: 2.4.8
Type: Application

32. For a certain brand of bicycle, $P(x) = 1.07^x$ Canadian dollars gives the profit from the sale of *x* mountain bikes. On June 27, 2009, *P* Canadian dollars were worth $C(P) = \dfrac{P}{1.1525}$ American dollars. Assume that this conversion applies today. Write a function for profit in American dollars from the sale of *x* mountain bikes.

A) $A(x) = \dfrac{1.07^x}{1.1525}$

B) $A(x) = \dfrac{1.1525}{1.07^x}$

C) $A(x) = \dfrac{1.07x}{1.1525}$

D) $A(x) = \dfrac{1.07^x}{0.9284}$

E) $A(x) = 1.07^x$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 10
Learning Objective: Write a function for profit
Section: 2.4
Similar to Exercise: 2.4.10a
Type: Application

33. For a certain brand of bicycle, $P(x) = 1.01^x$ Canadian dollars gives the profit from the sale of x mountain bikes. On June 27, 2009, P Canadian dollars were worth $C(P) = \frac{P}{1.528}$ American dollars. Assume that this conversion applies today. Calculate the profit in Canadian and in American dollars from the sale of 600 mountain bikes. Round your answer to two decimal places.

A) $ 256.27 Canadian
$ 256.27 U. S.

B) $ 391.58 Canadian
$ 391.58 U. S.

C) $ 391.58 Canadian
$ 256.27 U. S.

D) $ 256.27 Canadian
$ 391.58 U. S.

E) $ 1.01 Canadian
$ 0.00 U. S.

Ans: C
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 10
Learning Objective: What is the profit
Section: 2.4
Similar to Exercise: 2.4.10b
Type: Application

34. A chemical reaction begins when a certain mixture of chemicals reaches 95°C. The reaction activity is measured in units (U) per 100 microliters (100μL) of the mixture. Measurements during the first 18 minutes after the mixture reaches 95°C are listed in Table below.

Chemical Reaction

Time(minutes)	Activity (U/100μL)
0	0.10
2	0.10
4	0.25
6	0.60
8	1.00
10	1.40
12	1.55
14	1.75
16	1.90
18	1.95

The Logistic model for the above data is approximately given as

$r(x) = \dfrac{1.937}{1 + 29.064e^{-0.421x}}$ U/100μL .

Estimate the average rate of change of the reaction activity between 5 minutes and 15 minutes. Round your answer to three decimal places.

A) 0.141 U/100μL per minute

B) 0.071 U/100μL per minute

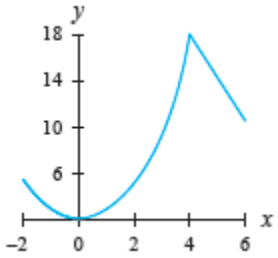
C) 0.227 U/100μL per minute

D) 0.113 U/100μL per minute

E) 7.074 U/100μL per minute

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 13
Learning Objective: Estimate the average rate of change
Section: 2.4
Similar to Exercise: 2.4.13b
Type: Application

35. Determine whether the function is continuous or differentiable for given input values.



A) The function is continuous on the input interval shown, but it is not differentiable at $x = 4$.

B) The function is continuous on the input interval shown, but it is not differentiable at $x = 6$.

C) The function is not continuous on the input interval shown, but it is not differentiable at $x = 6$.

D) The function is not continuous on the input interval shown, but it is not differentiable at $x = 4$.

E) The function is both continuous and differentiable at $x = 4$.

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 15-18
Learning Objective: Determine whether the function is continuous
Section: 2.4
Similar to Exercise: 2.4.16
Type: Skill

36. The CPI (for all urban consumers) for college tuition and fees between 2000 and 2008 is given below.

Tuition CPI

Year	CPI
2000	331.9
2001	361.9
2002	387.4
2003	425.5
2004	462.2
2005	492.8
2006	527.2
2007	559.2
2008	591.8

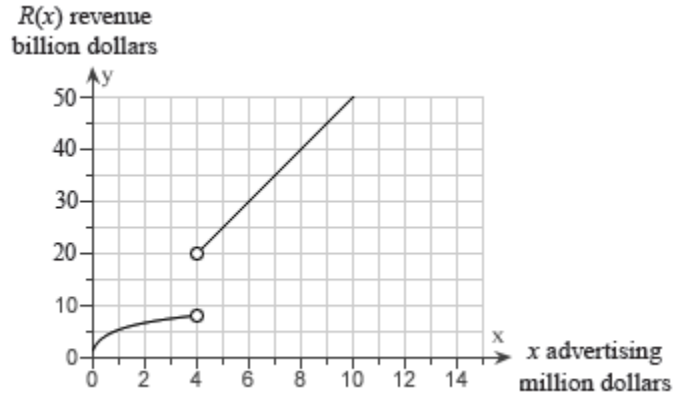
The CPI (for all urban consumers) for college tuition and fees between 2000 and 2008 where x is the number of years since 2000, data from 2000 through 2008 is approximately given as $c(x) \approx 32.97x + 328.10$.

Calculate the percentage rate of change in the CPI in 2006.

A) 6.270%
B) 525.92%
C) 52.592%
D) 5.259%
E) 6.44%

Ans: *(No Answer Provided)*
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Difficult
Exercise Group: 17
Learning Objective: Calculate the percentage rate of change
Section: 2.5
Similar to Exercise: 2.4.17d
Type: Application

37. When advertising an existing commodity, companies are interested in changes in revenue totals at various levels of advertising. The figure shows the advertising threshold effect for a certain commodity.



Determine the input value where the line tangent to the graph is not defined.

A) $x = 4$
B) $x = 0$
C) $0 \le x < 4$
D) $4 < x \le 10$
E) $0 \le x \le 10$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 19-22
Learning Objective: For what input value is the line tangent to the graph not defined
Section: 2.4
Similar to Exercise: 2.4.22a
Type: Application

38. Find the derivative of the given function using the algebraic method.

$f(x) = -7x^2 + 5$

A) $f'(x) = -10x$

B) $f'(x) = -14x + 5$

C) $f'(x) = -10x + 7$

D) $f'(x) = -2x$

E) $f'(x) = -14x$

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-6
Learning Objective: Find the derivative using the Algebraic Method
Section: 2.5
Similar to Exercise: 2.5.1
Type: Skill

39. Find the derivative of the given function using the algebraic method.

$f(t) = 2(t+9)^2$

A) $f'(t) = 4(t+9)$

B) $f'(t) = 4(t+9)^2$

C) $f'(t) = 2(t+9)$

D) $f'(t) = 18(t+2)^2$

E) $f'(t) = 18(t+2)$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-6
Learning Objective: Find the derivative using the Algebraic Method
Section: 2.5
Similar to Exercise: 2.5.3
Type: Skill

40. For the function given, find $f'(x)$.

$f(x) = x^4 - 15x - 6$

A) $x^3 - 15$
B) $4x^3 - 6$
C) $4x^3 - 15$
D) $4x^4 - 15x$
E) $x^4 - 15x - 6$

Ans: C
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-6
Learning Objective: Differentiate a function with the power rule
Section: 2.5
Similar to Exercise: 2.5.4
Type: Skill

41. Using the following table, estimate $N'(15)$.

Years Since 1970	**Newspapers [*N(t)*]**
0	1980
5	4261
10	6970
15	7607

A) 127 newspapers per year
B) 499 newspapers per year
C) 542 newspapers per year
D) 335 newspapers per year
E) 64 newspapers per year

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 7-10
Learning Objective: Estimate slope from a data table
Section: 2.5
Similar to Exercise: 2.5.7
Type: Application

42. If $f(x) = x^5$, find $\left.\frac{df}{dx}\right|_{x=-2}$.

A) $\left.\frac{df}{dx}\right|_{x=-2} = -32$

B) $\left.\frac{df}{dx}\right|_{x=-2} = -192$

C) $\left.\frac{df}{dx}\right|_{x=-2} = 320$

D) $\left.\frac{df}{dx}\right|_{x=-2} = -128$

E) $\left.\frac{df}{dx}\right|_{x=-2} = 80$

Ans: E
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 7-10
Learning Objective: Estimate the derivative of the function at specified value
Section: 2.5
Similar to Exercise: 2.5.9
Type: Skill

43. If $f(x)=\frac{500}{\sqrt{x}}+10\sqrt{x}$, find $\left.\frac{df}{dx}\right|_{x=25}$.

A) $\left.\frac{df}{dx}\right|_{x=25}=-1$

B) $\left.\frac{df}{dx}\right|_{x=25}=1$

C) $\left.\frac{df}{dx}\right|_{x=25}=-5$

D) $\left.\frac{df}{dx}\right|_{x=25}=5$

E) $\left.\frac{df}{dx}\right|_{x=25}=3$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 7-10
Learning Objective: Estimate the derivative of the function at specified value
Section: 2.5
Similar to Exercise: 2.5.10
Type: Skill

44. An object is dropped off a building. Ignoring air resistance we know from physics that its height above ground t seconds after being dropped is given by $\text{Height}=-16t^2+150$ feet. Determine the object's velocity after 2.5 seconds.

A) –80 feet per second
B) –50 feet per second
C) –20 feet per second
D) –16 feet per second
E) –32 feet per second

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Difficult
Exercise Group: 11
Learning Objective: Calculate rate-of-change in polynomials
Section: 2.5
Similar to Exercise: 2.5.11
Type: Application

45. Clinton County, Michigan, is mostly flat farmland partitioned by straight roads (often gravel) that run either north/south or east/west. A tractor driven north on Lowell Road from the Schafers farm's mailbox is

$f(x) = 0.28t + 0.4$ miles

north of Howe Road *t* minutes after leaving the farm's mailbox. How far is the Schafers' mailbox from Howe Road.

A) 0.4 miles
B) 0.28 miles
C) 0.68 miles
D) 0.12 miles
E) 2.8 miles

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 12
Learning Objective: Estimate the derivative
Section: 2.5
Similar to Exercise: 2.5.12a
Type: Application

46. The amount of airline fuel consumed by an Airline company each year between 2001 and 2009 can be modeled as

$f(t) = -0.009t^2 + 0.12t + 1.19$ billion gallons

where *t* is the number of years since 2001. Calculate the amount of fuel consumed in 2009.

A) 2.999 billion gallons
B) 1.541 billion gallons
C) 2.189 billion gallons
D) 10.829 billion gallons
E) 2.351 billion gallons

Ans: B
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 15
Learning Objective: Calculate the amount
Section: 2.5
Similar to Exercise: 2.5.15a
Type: Application

47. The percentage of adults who said they got a flu shot before the winter of year *t* is given by

$S(t) = -0.12t^2 + 5.27t + 5$ percent

where *t* is the number of years since 2000, data from $2004 \le t \le 2009$. Find the derivative using the algebraic method.

A) $S'(t) = -0.24t + 5.27$

B) $S'(t) = -0.12t^2 + 5.27t + 5$

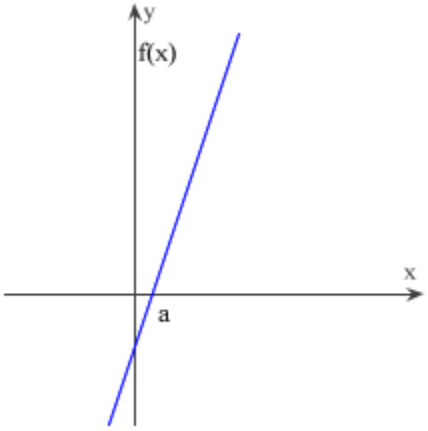
C) $S'(t) = 0.24t - 5.27$

D) $S'(t) = -0.24t^2 + 5.27t$

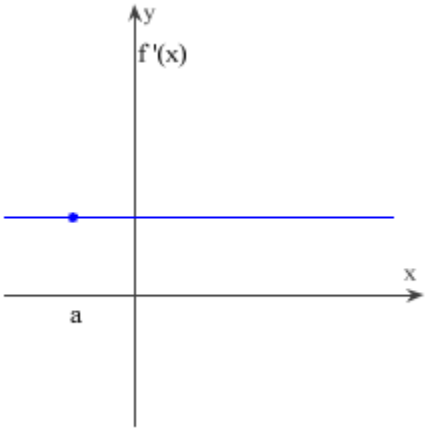
E) $S'(t) = 0.24t^2 - 5.27t$

Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 16
Learning Objective: Find the derivative
Section: 2.5
Similar to Exercise: 2.5.16a
Type: Application

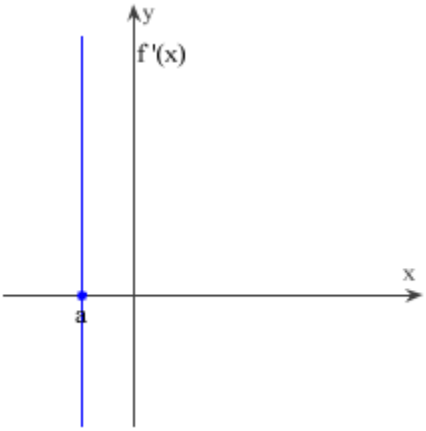
48. Sketch a slope graph of the function.



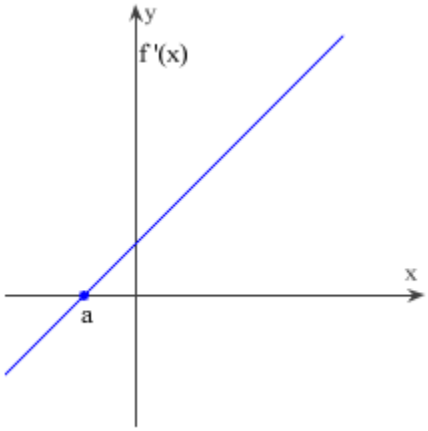
A)



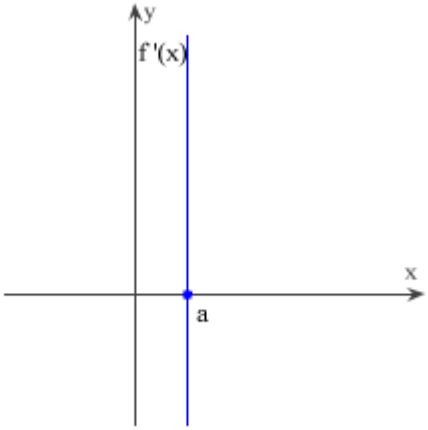
B)



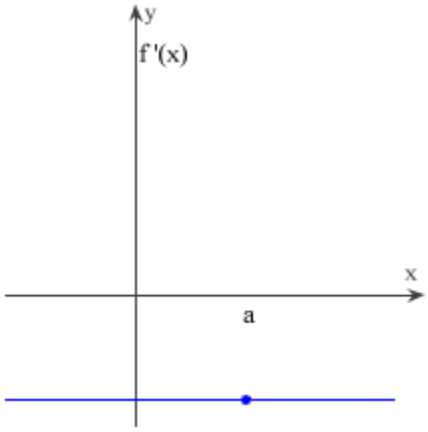
C)



D)

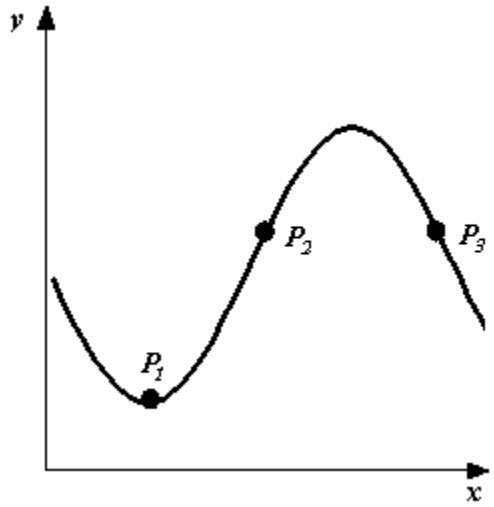


E)



Ans: A
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-10
Learning Objective: Sketch a slope graph
Section: 2.6
Similar to Exercise: 2.6.2c
Type: Skill

49. By imagining tangent lines at points P_1, P_2, and P_3, state whether the slopes are positive, zero, or negative at these points.



A) At P_1 : positive slope
At P_2 : negative slope
At P_3 : positive slope

B) At P_1 : zero slope
At P_2 : negative slope
At P_3 : positive slope

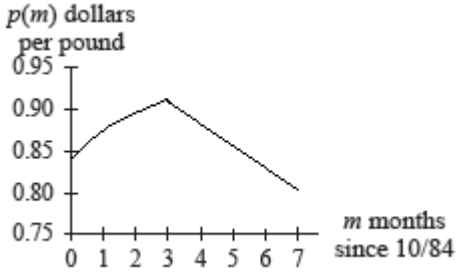
C) At P_1 : zero slope
At P_2 : positive slope
At P_3 : negative slope

D) At P_1 : positive slope
At P_2 : positive slope
At P_3 : positive slope

E) At P_1 : positive slope
At P_2 : negative slope
At P_3 : negative slope

Ans: C
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Easy
Exercise Group: 1-10
Learning Objective: Identify whether the slopes are positive, zero, or negative at the given points
Section: 2.6
Similar to Exercise: 2.6.4
Type: Concept

50. The figure shows cattle prices (for choice 600-pound steer calves) from October 1994 through May 1995.



Identify the input value where the derivative fail to exist.

A) $m = 4$
B) $m = 3$
C) $m = 0$
D) $m = 7$
E) $m = 2$

Ans: B
Format: Multiple Choice
Algorithmic: Yes
Difficulty: Medium
Exercise Group: 1-10
Learning Objective: Indicate the input interval
Section: 2.6
Similar to Exercise: 2.6.18a
Type: Concept