Introduction to MATLAB, Fourth Edition
by Delores M. Etter

Solution Manual

Chapter 1

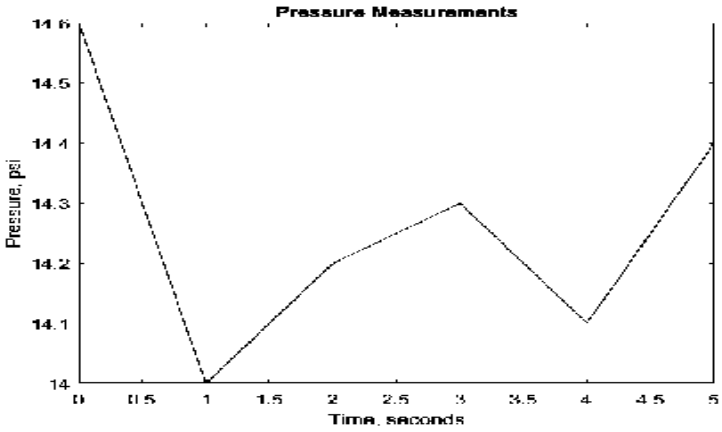
1. F	2. T	3. F	4. T	5. F
6. F	7. F	8. F	9. T	10. T
11. T	12. F	13. F	14. T	15. T
16. F	17. F	18. F	19. F	20. T

21. (d)	22. (b)	23. (c)	24. (a)	25. (a)
26. (b)	27. (e)	28. (c)	29. (d)	30. (c)
31. (a)	32. (b)	33. (c)		

34. program	35. hardware	36. CPU
37. output devices	38. system software	39. algorithm
40. compilation	41. spreadsheet	42. syntax or grammar
43. operating system	44. ALU	45. debugging
46. logic errors	47. utilities	48. microprocessor
49. word processor	50. machine language	

51. average = 14.2667

```
%-----------------------------------------------------
%  Solution to 1.51
%  This program computes the average pressure
%  and then plots the pressure data.
%
time = [0,1,2,3,4,5];
pressure = [14.6, 14.0, 14.2, 14.3, 14.1, 14.4];
average = mean(pressure)
plot(time,pressure), title('Pressure Measurements'),
     xlabel('Time, seconds'),
     ylabel('Pressure, psi'), grid
%-----------------------------------------------------
```



Chapter 2

1.	not legal	2.	not legal	3.	legal	4.	legal
5.	legal	6.	not legal	7.	not legal	8.	legal
9.	not legal	10.	not legal	11.	legal		

12. valid function names: **`global, help, sin, input`**

13.	1.75	14.	60	15.	60	16.	75
17.	15,625	18.	9	19.	1		

20. **`5^2`**

21. **`(5+3)/(5*6)`**

22. **`(4+6^3)^0.5`**

23. **`9*(6/12)+7*5^(3+2)`**

24. **`1+5*3/(6*6)+2^(2-4)*1/5.5`**

25.
```
r = 5;
area = pi*r*r
```

26.
```
r = 10;
surface = 4*pi*r*r
```

27.
```
r = 2;
vol = 4/3*pi*r^3
```

28.
```
r = 3;
h = [1,5,12];
vol = pi*r*r*h
```

29.
```
h = 12;
b = [2,4,6];
area = 0.5*b*h
```

30.
```
h = 12;
b = [2,4,6];
area = 0.5*b*h;
vol = area*10
```

31.
```
x = linspace(1,20,20);
```

32.
```
x = linspace(0,2*pi,200);
```

33.
```
x = linspace(4,20,15);
```

34.
```
d = 0:10:360;
r = d*2*pi/360;
```

35.
```
cm = 0:2:50;
inch = cm/2.54;
```

36.
```
mph = linspace(0,100,14);
fps = mph*5280/(60*60);
```

37.
```
t = 0:2:100;
g = 9.8;
d = 0.5*g*t.*t;
```

38.
```
mass1 = 6e24;
mass2 = 7.4e22;
r = 3.9e8;
G = 6.673e-11;
F = G*m1*m2/(r*r);
```

39.
```
mass1 = 6e24;
mass2 = 7.4e22;
r = linspace(3.8e8,4e8,10);
G = 6.673e-11;
F = G*m1*m2/(r.*r);
```

40.
```
B = A(:,1);
```

41.
```
C = A(2,:);
```

42.
```
D = A(:,1:3);
```

43.
```
x = A(:,2:4);
F = x(:);
```

44.
```
x = A(:,2:4);
G = x(:)';
```

45.
```
%-----------------------------------------------------
%  Solution to 2.45
%  This program estimates time required for a stride,
%  given L, the length of a leg in feet.
%
%  A stride takes Ts=T/2 seconds,
%  where T = 2 pi sqrt(2L/(3g))
%        g = 32 ft/(s^2)
%        sqrt(x) = (x)^0.5

L = input('Input length of a leg in feet:');
Ts = pi *(2*L/(3*32))^0.5
%-----------------------------------------------------
```

Chapter 3

1.
```
angle = 0:0.1:2*pi;
sine = sin(angle);
cosine = cos(angle);
tangent = tan(angle);
display('angle(radians), sine, cosine, tangent');
[angle', sine', cosine', tangent']
```

2.
```
g = 9.9;
v = 100;
k = v*v/g;
theta = 0:0.05:pi/2;
R = k*sin(2*theta);
[max_R,n] = max(R);
max_theta = theta(n);
display('max range and corresponding angle in radians')
[max_R, max_theta]
```

3.
```
b = 2:10;
logb = log(10)./log(b);
display('base and log of 10 to the specified base')
[b', logb']
```

4.
```
P0 = 100;
r = 0.9;
t = 10;
P = P0*exp(r*t);
display('rabbits at end of 10 years')
P
```

5.
```
Q = 8000;
R = 1.987;
k0 = 1200;
T = 100:50:500;
k = k0*exp(-Q./(R*T));
display('temperature(K) and reaction rates')
[T', k']
```

6.
```
G = [68,83,70,75,82,57,5,76,85,62,71,96,78,76,72,75,83,93];
display('mean, median standard deviation, count'];
[mean(G) median(G) std(G) length(G)]
```
most typical value is the median because it represents one of the values

7.
```
x = 23.5*randn(1,10000) + 80;
display('mean and standard deviation')
[mean(x) std(x)]
```

8.
```
t = 0:2:100;
ht = 2.13*t.^2 - 0.0013*t.^4 + 0.000034*t.^4.751;
display('time and height')
[t', ht']
```

9. (assumes statements from solution to problem 8)
```
[max_ht, n] = max(ht)
```

10. (assumes statements from solution to problem 8 and 9)
```
max_time = t(n)
```

11. A simple way to create the data file is to use the Notebook application, and store the file using a `.dat` extension.

```
load sensor.dat
[n_rows, n_cols] = size(sensor);
display('Number of sensors:')
n_cols
display('Number of seconds:')
n_rows
```

12. (assumes statements from solution to problem 11)
```
[max_s,n] = max(sensor);
k = 1:n_row;
display('sensor number, max value, corresponding time(s)')
[k', max_s', (n-1)']
```

13. (assumes statements from solution to problem 11)

```
mean_s = mean(sensor);
std_s = std(sensor);
mean_all = mean(sensor (:));
std_all = std(sensor (:));
display('sensor number, mean, standard deviation')
[k', mean_s', std_s']
display('overall mean and standard deviation')
[mean_all, std_all]
```

14.

```
temps = 2*randn(1,121)+70;
```

15. (assumes statement from solution to problem 14)

```
time = 1:120;
plot(time,temps)
```

16. (assumes statement from solution to problem 14)

```
display('maximum and minimum temperatures')
[max(temps), min(temps]
```

17.

```
%-----------------------------------------------------
%  Solution to 3.17
%  This program estimates the age of an artifact,
%  based on the proportion of carbon 14 remaining.
%
%  age in years = - ln(carbon 14 proportion remaining)/0.0001216

C14prop = input('proportion of carbon 14 remaining:');
age_years = - log(C14prop)/0.0001216;
fprintf('Estimated age is %8.2f years\n', age_years);
%-------------------------------------------------------
```

18.

```
%-----------------------------------------------------
%  Solution to 3.18
C14prop = input('proportion of carbon 14 remaining:');
age_centuries = - log(C14prop)/0.01216;
fprintf('Estimated age is %8.2f centuries\n', age_centuries);
%-------------------------------------------------------
```

19.

```
%-----------------------------------------------------
%  Solution to 3.19
C14prop = input('proportion of carbon 14 remaining:');
age_years = - log(C14prop)/0.0001216;
fprintf('Estimated age is %d years, rounded\n', age_years);
%-------------------------------------------------------
```