Sheet 2

Exercise 1

In the following program, Can you run the code in part 1 and then the code in part 3?

```
clear; clc;
%part 1
x1 = 10
y1 = x1.^2
%part 2
x2 = 20
y2 = 3*x2.^3
%part 3
x3 = 30
y3 = 5*x3.^2 + 4*x2
```

Exercise 2

Explain why the following Matlab code is incorrect:

```
number_of_red_and_new_cars_that_have_been_used_in_the_year_2007_by_Chris_are = 10
number_of_red_and_new_cars_that_have_been_used_in_the_year_2007_by_John_are = 11
```

Exercise 3

Write a Matlab program to evaluate r using the minimum number of parentheses, where x=2, y=3, z=4.

1. $r = \dfrac{x + \dfrac{y}{z}}{y^2} - 1$
2. $r = \dfrac{x + \dfrac{y}{z}}{y^2 + 3z} - 1$
3. $r = \dfrac{e^{\cos(2x)+1} + 2x}{\ln(x^2 + 1) + 2}$
4. $r = \tan^{-1}(x\tan(x^{\frac{1}{3}}))$
5. $r = \dfrac{-x + \sqrt{x^2 - 4yz}}{2y}$
6. $r = \dfrac{\dfrac{\cos(2x + 1) + 2}{3x^2 - 4}}{\dfrac{2\sqrt{y}}{\sin^{-1}(0.1z)}}$

Exercise 4

Write the mathematical expression to find r that is equivalent to the following Matlab program, where a = 2, b = 3, c = 4, d = 5.

7. `r = (a+1)/b^2-3`
8. `r = a+1/b^2-3`
9. `r = a+1/(b^2-3)`
10. `r = a+(1/b^2-3)`
11. `r = a+1/(b^2)-3`
12. `r = (a+b)/(c+d)^2`
13. `r = cos(2*a^2)^3/b-4`
14. `r = log(acos(0.2*b)+sin(a))`
15. `r = log(acos(0.2*b))+sin(a)`

Exercise 5

Explain the operation of the Matlab commands:

```
x = -1;
y = 2;
r = x&~y;
```

```
x = 1;
y = 2;
m = (x > y)|(y < -x);
```

```
x = 1;
y = -2;
n = (x > y)&(y < x)
```

Exercise 6

Write a Matlab command that creates a vector of the odd whole numbers between 11 and 21 using the linear method.

Exercise 7

Write a Matlab command that creates the following vectors using the linear spacing method.

1. $x = [-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5]$.
2. $y = [5, 4, 3, 2, 1, 0, -1, -2, -3, -4, -5]$.
3. $z = [10, 8, 6, 4, 2, 0, -2, -4]$.
4. $r = [1/2, 1/4, 1/6, 1/8]$.
5. $s = [0, 1/2, 2/3, 3/4, 4/5]$.

Exercise 8

Write a Matlab command that creates the following vectors using the linear spacing method and the linear method.

1. $x = [-5+i5, -4+i4, -3+i3, -2+i2, -1+i1]$.
2. $y = [1/2, 1/4+i1/2, 1/6+i2/3, 1/8+i3/4, 1/10+i4/5]$.

Exercise 9

Explain the operation and the output of the following Matlab commands:

1.
```
x = 2:20;
a = find(x > 2, 4);
b = x(a);
```

```
2. c = find(x >= 10, 4, 'first');
   d = x(c);
3. e = find(x ~= 2, 12, 'last');
   f = x(e);
```

Exercise 10

Given a vector x = [3, 11, -9, -13, -1, 1, -11, 9, -6, -2], write the Matlab command(s) that will do the following:
a) Use the find Matlab function b) Do not use the find Matlab function.

1. Set values of x that are multiples of 3 to the value 3. Hint: Use the Matlab function rem.
2. Multiply the values of x that are even by 5.
3. Extract the values of x that are greater than 10 into a vector called y.
4. Set the values in x that are less than the mean of x to 0.
5. Set the values in x that are above the mean to their difference from the mean.
6. Set the values of x that are positive to -1.

Exercise 11

Let a vector x = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]. Write Matlab command(s) to do the following:
1. Add 10 to each element in x. Assign the result to a new vector m.
2. Add 3 to only the odd-index elements of x, that is, the result should now be equal to [4, 2, 6, 4, 8, 6, 10, 8, 12, 10]. Assign the result to a new vector r.
3. Compute the square root of each element in x. Assign the result to a new vector s.
4. Compute the square of each element in x. Assign the result to a new vector t.

Exercise 12

Write the Matlab commands that produce the following figure. Hint: Use the Matlab command axis to scale the horizontal and vertical axis of the figure.