MTH229

Using MATLAB as a Calculator

Project 1– Exercises

NAME: _____
SECTION: _____
INSTRUCTOR: _____

Exercise 1:

a. What is the output of the following commands:

```
>> a=3; b=4; c=5;
>> a + b/c
```

(1) Circle one:
1. 3 4/5
2. 1.6
3. 3.8
4. 7/5

Exercise 2:

a. Use assignment to help you compute

$$3 - \frac{3^2 - 2 \cdot 3}{2 \cdot 3 - 2}.$$

(2) Answer: _____

Exercise 3:
One of these things is **not** like the others. Which of these MATLAB commands is not like the other two? To help you out, try doing this with some values for a, b and c like

```
>> a= 3; b=13; c= 23;
```

a. **(3) Circle one:**
   1. `>> a - b * c`
   2. `>> a - (b * c)`
   3. `>> (a - b) * c`

b. **(4) Circle one:**
   1. `>> a * (b - c)`
   2. `>> (a * b) - c`
   3. `>> a * b - c`

c. **(5) Circle one:**
   1. `>> a / b + c`
   2. `>> a / (b + c)`
   3. `>> (a / b) + c`

d. **(6) Circle one:**
   1. `>> (a + b) / c`
   2. `>> a + (b / c)`
   3. `>> a + b / c`

e. Which operations have higher precedence?
   (7) Circle one:
   1. multiplication/division
   2. addition/subtraction

Exercise 4:
Repeat the same exercise with the following expressions.

a. **(8) Circle one:**
   1. `>> a ^ (b * c)`
   2. `>> (a ^ b) * c`
   3. `>> a ^ b * c`

b. **(9) Circle one:**
   1. `>> a * (b ^ c)`
   2. `>> a * b ^ c`
   3. `>> (a * b) ^ c`

c. **(10) Circle one:**
1. `>> a / b ^ c`
2. `>> (a / b) ^ c`
3. `>> a / (b ^ c)`

d. **(11) Circle one:**
1. `>> a ^ b / c`
2. `>> (a ^ b) / c`
3. `>> a ^ (b / c)`

e. Which operations have higher precedence?
(12) Circle one:
1. multiplication/division
2. exponentiation

f. Using the rules you found, evaluate the following expression and rewrite it with parentheses showing the order in which MATLAB evaluates the operations. (For example, `a + b + c = (a + b) + c` and not `a + (b + c)`.) In this example there are 4 operations, so your answer should have 3 pairs of parentheses.

```
>>     7 - 3 ^ 2 / 9 + 4
```

(13) Answer:

Exercise 5:
Evaluate the following expressions first using *left-to-right* order, and then from *right-to-left*. Enter both answers separated by a comma.

a. $3 - 3 - 3$
(14) Answer: _____

b. $6/3/2$
(15) Answer: _____

c. `2^3^2`
(16) Answer: _____

Exercise 6:
Investigate the expressions below to see the order in which the operations are performed by MATLAB. (For example, does $5-3-2=(5-3)-2$ or $5-(3-2)$?)

```
>> 5 - 7 - 8
>> c - a + b - c
>> 5 / 7 / 8
>> 5 / 7 * 8 * 9
```

What rule(s) does MATLAB use when evaluating expressions with two or more operations of the same priority?
(17) Circle one:
1. from right to left
2. from middle to end
3. from left to right

Exercise 7:
Practice what you have just reviewed to evaluate the following. Let

```
>> a=4;b=5;c=8;
```

a.

$$\frac{a^b - c/b}{c-a}$$

(18) Answer: _____

b.

$$\frac{a^{(c-b)}}{c-b}$$

(19) Answer: _____

c.

$$\frac{a^{3/2}}{b}$$

(20) Answer: _____

d.

$$\frac{a-b(c-a)}{c-a}$$

(21) Answer: _____

Exercise 8:
Use MATLAB to evaluate the following expressions.

a. Calculate the sine of 40 degrees using MATLAB. MATLAB uses radians for all angle measurements. You will need to convert degrees to radians first.
(26) Answer: _____

b. Evaluate $\sin^2 65^\circ$
(27) Answer: _____

c. Evaluate $e^{(10-8.5)/3}$
(28) Answer: _____

d. Evaluate $\arcsin(\sin(3\pi/4))$
(29) Circle one:
1. $3\pi/4$
2. $-5\pi/4$
3. $\pi/4$

Exercise 9:
Store the number $1, 2, 3$ in a vector named `x`. Answer the following for this vector.

a. What is `x+x`?
(30) Circle one:
1. The vector `[1, 4, 9]`
2. The vector `[2, 4, 6]`
3. An error

b. What is the output of `x * x`
(31) Circle one:
1. The vector `[1, 4, 9]`
2. The vector `[2, 4, 6]`
3. An error

Exercise 10:
Find MATLAB commands which generate the following lists. Make sure your answer is correct.

a. The odd numbers 1,3,...99
(32) Answer:

b. The numbers 10,20,30,...120
(33) Answer:

Exercise 11:

a. What `linspace` command produces this output:

```
1.000 1.500 2.000 2.500 3.000 3.500 4.000
```

(34) Circle one:
1. `linspace(1,7,4)`
2. `linspace(1,4,1/2)`
3. `linspace(1,4,7)`
4. `linspace(1,1/2,4)`

b. What is the last value output by the command

```
>> linspace(0,pi)
```

(35) Answer: _____

Exercise 12:
Two common measures of temperature are the Fahrenheit and the Centigrade scales.

a. Find room temperature in Celsius (F = 68°)
(36) Answer: _____

b. Find the average body temperature in Celsius (F = 98.6°)
(37) Answer: _____

c. Let X be a vector of Fahrenheit values between -100 and 100 in step size of 20, and Y be the corresponding Celsius values. Which MATLAB commands give this?
(38) Circle one:
1. `X=-100:10:100; Y=9/5*X+32`
2. `X=-100:20:100; Y=9/5*x+32`
3. `X=-100:10:100; Y=5/9*(X-32)`
4. `X=-100:20:100; Y=5/9*(X-32)`

d. If two vectors are the same length, a table can be made from them that allows you to compare their entries. The syntax is either `[X;Y]` or `[X;Y]'`. Look carefully at the table of X and Y values. At what temperature is the Celsius and Fahrenheit measurement the same?
(39) Answer: _____