

NAME: _____

(All questions worth 10 points, 100 points total.)

1. Prove that:

$$\sum_{i=1}^n (6i^2 + 2i) = 2n^3 + 4n^2 + 2n$$

2. Find a Boolean Expression for the following function f .

A	B	C	D	f
T	T	T	T	T
T	T	T	F	T
T	T	F	T	T
T	T	F	F	T
T	F	T	T	F
T	F	T	F	F
T	F	F	T	F
T	F	F	F	F
F	T	T	T	T
F	T	T	F	F
F	T	F	T	T
F	T	F	F	F
F	F	T	T	F
F	F	T	F	T
F	F	F	T	F
F	F	F	F	T

3. Multiply the following matrices.

$$\begin{pmatrix} 1 & 2 & 1 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$$

4. Multiply the following matrices.

$$\begin{pmatrix} 1 \\ 3 \\ 4 \end{pmatrix} \begin{pmatrix} 4 & 2 & 2 \end{pmatrix}$$

5. Combine the following permutations as indicated. Remember that $(f \circ g)(x) = f(g(x))$.

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 2 & 4 \end{pmatrix} \circ \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$$

6. Combine the following permutations as indicated.

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} \circ \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 1 & 5 & 3 & 2 \end{pmatrix}$$

7. Give the addition and multiplication tables for Modulo 6.

Addition:

+	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

7. Continued
Multiplication:

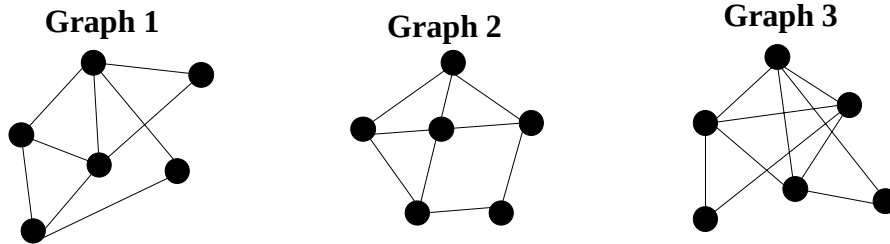
$\times$	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

8. Convert the following expressions to prefix notation.

$$(x + y) * (a + b)$$

$$x * x + 2 * x + 2 * y$$

9. Do the following three graphs have an Euler cycle and Euler path or neither?



10. Define the following graph terms.

a. Path

b. Simple path

c. Connected Component

d. Adjacent

c. Strongly Connected