

NAME: \_\_\_\_\_

1. Prove that:

$$\sum_{i=1}^n (7i + 9) = \frac{1}{2}(7n^2 + 25n)$$

2. Prove that:

$$\sum_{i=0}^n 4^i = \frac{4^{n+1} - 1}{3}$$

3. Multiply the following matrices.

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

4. Multiply the following matrices.

$$\begin{pmatrix} 0 & 1 \\ 2 & 1 \\ 3 & 2 \end{pmatrix} \begin{pmatrix} 1 & 2 & 2 \\ 3 & 0 & 1 \end{pmatrix}$$

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

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 1 & 4 & 5 & 6 & 3 \end{pmatrix} \circ \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 2 & 1 & 4 & 3 & 5 \end{pmatrix}$$

6. Combine the following permutations as indicated.

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

7. Convert from binary to hexadecimal:

a. 10001011010

b. 1101

c. 11011011011111

d. 1110100010010111010000100001

8. Convert from decimal to binary two's complement numbers. The result will be 8 bits long.  
25, -50, 13, -29.

9. Convert from decimal to binary signed magnitude numbers. The result will be 8 bits long.  
25, -50, 13, -29.

10. Convert the following two expressions to prefix notation.  
 $((a*b)+c)*d$                        $((q*r)/(s+t))$