Algebra Review Problems

The following problems are provided as examples of some of the algebra concepts and topics that are tested on the mathematics placement test used at UNCW. They are not intended to be a complete summary of all topics covered on the test or representative of prerequisite material for any UNCW mathematics course. See our website (www.uncw.edu/mathlab) for more information about the placement test.

1. Let \( f(x) = 4x^3 + 2x^2 - 16x + 10 \) and \( g(x) = 2(x-1)^2 \). Find (and simplify)
   a.) \( f(-1) \)  
   b.) \((f + g)(3)\)  
   c.) \( f(x + 2) \)  
   d.) \( \frac{f(4)}{g(0)} \)  
   e.) \( \frac{f(x)}{g(x)} \)  
   f.) \( f[g(2)] \)  
   g.) \( f(x) - 4g(x) \)  
   h.) \( 2f(x) - [f(x) \cdot g(x)] + 1 \)

2. If \( f(x) = kx^2 - 2x + 1 \) and \( f(2) = -7 \), then find \( f(5) \).

3. Find \( x \):
   a.) \( \log_3(9) = x \)  
   b.) \( 6^x = 216 \)

4. \( \frac{7!}{4!2!} = ? \)

5. If \( i^2 = -1 \), find (and put in \( a + bi \) form)
   a.) \( (3i)^2 \)  
   b.) \( i^{89} \)  
   c.) \( (4-i)(-3 + 2i) \)

6. If \( A = \begin{bmatrix} 1 & -3 \\ 2 & 5 \end{bmatrix} \) and \( B = \begin{bmatrix} 4 & 0 \\ -3 & -1 \end{bmatrix} \), then what is \( A - 3B \) ?

7. The demand for a certain vendor’s goods is given by \( d = 200 - 40q \), where \( q \) is the number of items produced. The cost of producing the product is given by \( c = 500 + 10q \). What is the cost as a function of the demand?

8. Write a mathematical equation that is equivalent to the sentence “If 2 is subtracted from the reciprocal of \( x \), the result is the product of \( x \) and \( a \).”

9. Which of the following is a logical consequence of the 3 statements given below?
   I. All zabs are blue.
   II. Not all yeeks are blue.
   III. Some jilps are zabs.
   a.) No jilps are yeeks.
   b.) Some zabs are yeeks.
   c.) No yeeks are zabs.
   d.) Some jilps are blue.
   e.) No yeeks are blue.
10. Find the slope for the line: $2x - 3y = 4$

11. What is the fifth term in the geometric sequence which begins $2, -1, \frac{1}{2}$?

12. If Sally can paint a fence by herself in 6 hours and Sally and Linus together can paint the same fence in 4 hours, how long would it take Linus to paint the fence by himself?

13. Solve the following:
   
a.) Factor: $3x^3 + 5x^2 - 2x$
   
b.) Foil: $(x - 3)(-5x + 2)$

14. What is the value of the determinant?
   
   a.) $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$
   
   b.) $\begin{vmatrix} 2 & -5 \\ -1 & 3 \end{vmatrix}$
   
   c.) $\begin{vmatrix} -2 & 1 \\ -3 & 2 \end{vmatrix} - \frac{i}{2} \begin{vmatrix} 2 & 1 \\ 2 & 3 \end{vmatrix}$

15. What is the distance between the points $(-1, 4)$ and $(2, 9)$?

**ANSWERS**

1. a.) 24
   
   b.) 96
   
   c.) $4x^3 + 26x^2 + 40x + 18$
   
   d.) 117
   
   e.) $2x + 5$
   
   f.) 18
   
   g.) $4x^3 - 6x^2 + 2$
   
   h.) $-8x^5 + 12x^4 + 40x^3 - 84x^2 + 40x + 1$

2. -34

3. a.) 2
   
   b.) 3

4. 105

5. a.) -9
   
   b.) $i$
   
   c.) $-10 + 11i$

6. $\begin{bmatrix} -11 & -3 \\ 11 & 8 \end{bmatrix}$

7. $c = 550 - \frac{d}{4}$

8. $\frac{1}{x} - 2 = ax$

9. d.)

10. $\frac{i}{3}$

11. $\frac{1}{8}$

12. 12 hours

13. a.) $x, 3x - 1, x + 2$
   
   b.) $-5x^2 + 17x - 6$

14. a.) $ad - bc$
   
   b.) 1
   
   c.) -1

15. $\sqrt{34}$