

BRONX COMMUNITY COLLEGE  
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 03  
Nikos Apostolakis

Exam 1  
March 19, 2009

KEY.

**Directions:** Write your answers in the provided space. To get full credit you *must* show all your work. Simplify your answers whenever possible. Be certain to indicate your final answer clearly. Each problem is worth 5 points

1. Evaluate:  $7 - (4 - 7)^2 = 7 - (-3)^2$   
 $= 7 - 9$   
 $= -2$

2. Evaluate:  $5 - 3(4 - 3) - 2^3 \div 8 \cdot 4 = 5 - 3(1) - 8 \div 8 \cdot 4$   
 $= 5 - 3 - 1 \cdot 4$   
 $= 5 - 7$   
 $= -2$

3. Evaluate:  $\frac{-3^3 + 27}{(-5)^2 + 25} = \frac{-27 + 27}{25 + 25} = \frac{0}{50} = 0$

4.  $0 - (-(-(-(-(-3)))))) = 0 - 3 = -3$

5. Evaluate:  $\sqrt{-3^2 + 2^3 + 1} = \sqrt{-9 + 8 + 1} = \sqrt{0} = \boxed{0}$

6. Evaluate:  $\frac{-16}{8} \cdot \frac{18}{-25} \cdot \left(\frac{10}{8}\right) \cdot \frac{1}{4} \cdot \frac{1}{4} = \boxed{+2}$

7. Evaluate, if  $a = -3$  and  $b = 5$ :  $-a + (-b)^2 = -(-3) + (-5)^2$   
 $= +3 + 25$   
 $= \boxed{28}$

8. Evaluate if  $x = -3$ ,  $y = 2$ :  $\frac{y-x}{4x+y} = \frac{(2) - (-3)}{4(-3) + (2)} = \frac{5}{-12+2} = \frac{5}{-10} = \boxed{-\frac{1}{2}}$

9. Evaluate if  $a = -2$ ,  $b = -3$ ,  $x = 5$ :  $ax - b(2a + 3x)$

$$\begin{aligned} ax - b(2a + 3x) &= (-2)(5) - (-3)(2(-2) + 3(5)) \\ &= -10 + 3(-4 + 15) \\ &= -10 + 3(11) \\ &= -10 + 33 \\ &= \boxed{23} \end{aligned}$$

10. Evaluate if  $x = -5, y = -4$ :  $(x + y)^2 - x^2 - y^2 - 2xy$

$$\begin{aligned} & \left( (-5) + (-4) \right)^2 - (-5)^2 - (-4)^2 - 2(-5)(-4) \\ & = (-9)^2 - 25 - 16 - 40 \\ & = 81 - 25 - 16 - 40 \\ & = 81 - 81 \\ & = \boxed{0} \end{aligned}$$

11. Evaluate if  $x = 2$ :

$$\frac{3x - 5}{x^2 - 4x + 4} = \frac{3 \cdot (2) - 5}{(2)^2 - 4(2) + 4} = \frac{6 - 5}{4 - 8 + 4} = \frac{1}{0}$$

This is undefined.

12. Simplify:  $(-2x^2y^3)^5 = -32x^{10}y^{15}$

13. Simplify:

$$\frac{\cancel{1}^1 \cancel{y^2}^2 \cancel{z^2}^2}{\cancel{4x^2}^2 \cancel{y^2}^2 \cancel{z^2}^2} = \frac{y^2 z^2}{2xw}$$

14. Subtract  $-2x^3 + 5x^2 - 3x + 7$  from  $5x^3 - 3x^2 - 6x + 2$ .

$$\begin{aligned} & 5x^3 - 3x^2 - 6x + 2 - (-2x^3 + 5x^2 - 3x + 7) \\ & = \underline{5}x^3 - \overline{3}x^2 - \underline{6}x + \underline{2} + \underline{2}x^3 - \overline{5}x^2 + \underline{3}x - \underline{7} \\ & = \boxed{7x^3 - 8x^2 - 3x - 5} \end{aligned}$$

15. Simplify:  $-3(x^2 - 2) + (4x - 7) + 2(-3x + 1) = -3x^2 + 6 + 4x - 7 - 6x + 2$   
 $= -3x^2 - 2x + 1$

16. Multiply:  $-3x^2y^3(5x^2 - 3y^3 + 2xy) = -15x^4y^3 + 9x^2y^6 - 6x^3y^4$

17. Multiply:  $(2 - x)(x^2 + 2x + 4) = 2x^2 + 4x + 8 - x^3 - 2x^2 - 4x$   
 $= 8 - x^3$

18. Multiply:  $(x + 8)(x - 3) = x^2 - 3x + 8x - 24$   
 $= x^2 + 5x - 24$

19. Divide:

$$\frac{12x^2y^3 - 6x^4y^2 + 3x^3y}{3x^2y}$$

$$= 4y^2 - 2x^2y + x$$

20. Which of the following numbers  $\boxed{-2}$ ,  $\boxed{-1}$ ,  $\boxed{0}$ ,  $\boxed{1}$ ,  $\boxed{2}$ ,  $\boxed{3}$  are solutions of the equation

$$x^4 - 2x^3 - 5x^2 + 6x = 0$$

Checking -2:

$$\begin{aligned}(-2)^4 - 2(-2)^3 - 5(-2)^2 + 6(-2) &= 0 \\ 16 - 2(-8) - 5(4) - 12 &= 0 \\ 16 + 16 - 20 - 12 &= 0 \\ 32 - 32 &= 0 \quad \checkmark\end{aligned}$$

Checking 2:

$$\begin{aligned}(2)^4 - 2(2)^3 - 5(2)^2 + 6 \cdot (2) &= 0 \\ 16 - 16 - 20 + 12 &= 0 \\ -8 &= 0 \quad \times\end{aligned}$$

Checking -1:

$$\begin{aligned}(-1)^4 - 2(-1)^3 - 5(-1)^2 + 6(-1) &= 0 \\ 1 + 2 - 5 + 6 &= 0 \\ 2 - 6 &= 0 \quad \times\end{aligned}$$

Checking 3:

$$\begin{aligned}(3)^4 - 2(3)^3 - 5(3)^2 + 6 \cdot (3) &= 0 \\ 81 - 2 \cdot 27 - 5 \cdot 9 + 18 &= 0 \\ 81 - 54 - 45 + 18 &= 0 \\ 99 - 99 &= 0 \quad \checkmark\end{aligned}$$

Checking 0:

$$\begin{aligned}(0)^4 - 2(0)^3 - 5(0)^2 + 6(0) &= 0 \\ 0 &= 0 \quad \checkmark\end{aligned}$$

So

$-2, 0, 1,$  and  $3$

are solutions of the equation.

Checking 1:

$$\begin{aligned}(1)^4 - 2(1)^3 - 5(1)^2 + 6 \cdot (1) &= 0 \\ 1 - 2 - 5 + 6 &= 0 \\ 0 &= 0 \quad \checkmark\end{aligned}$$