

BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 05
Nikos Apostolakis

Exam 4
November 15, 2016

Name: ANSWERS

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 4 points**

1. Given $a = -5$ and $b = 2$, evaluate the expression given below.

$$a^2 - 2ab + ab^2 = (-5)^2 - 2(-5)(2) + (-5)(2)^2$$

$$= 25 - 2(-5)(2) + (-5)(4)$$

$$= 25 + 20 - 20 = 25$$

- A. 25 B. -25 C. -20 D. 45

2. Solve for x : LCD = 6

$$3 \cdot \frac{(x+7)}{2} = \frac{(x+12)}{3} \cdot 6 \Leftrightarrow 3x + 21 = 2x + 24$$

$$\Leftrightarrow 3x - 2x = 24 - 21$$

$$\Leftrightarrow x = 3$$

- A. $x = 1$ B. $x = 5$ C. $x = 6$ D. $x = 3$

3. Simplify: $y^{-8}y^3 = y^{-5} = \frac{1}{y^5}$

- A. $-\frac{1}{y^5}$ B. $\frac{1}{y^5}$ C. $-y^5$ D. y^5

4. Simplify $\frac{-25x^6y^8}{5x^3y^2} = -5x^3y^6$

- A. $-5x^3y^6$ B. $-5x^9y^{10}$ C. $-5x^3y^4$ D. $-5x^{18}y^{12}$

5. Simplify $(a-5)^2 = (a-5)(a-5) = a^2 - 5a - 5a + 25 = a^2 - 10a + 25$

- A. $a^2 - 10a + 25$ B. $a^2 + 10a - 25$ C. $a^2 - 25$ D. $a^2 + 25$

6. Simplify: $(-5x^2 + 4x + 9) - (-2x^2 + 3x - 11) = -5x^2 + 4x + 9 + 2x^2 - 3x + 11$

$$= -3x^2 + x + 20$$

7. Simplify. Give your answers using positive exponents only: $(-3x^5y^{-4}w^{-3})^{-2}$

$$\begin{aligned}(-3x^5y^{-4}w^{-3})^{-2} &= (-3)^{-2} x^{-10} y^8 w^6 \\ &= \frac{y^8 w^6}{(-3)^2 x^{10}} \\ &= \boxed{\frac{y^8 w^6}{9x^{10}}}\end{aligned}$$

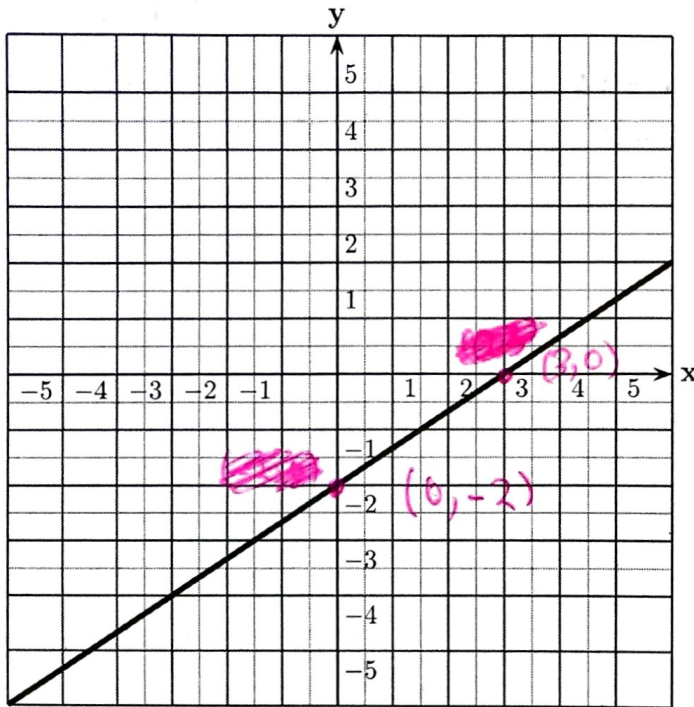
8. Simplify: $\frac{30x^7 - 10x^7 + 5x^3}{5x^3} = \frac{30x^7}{5x^3} + \frac{-10x^7}{5x^3} + \frac{5x^3}{5x^3} = 6x^4 - 2x^4 + 1$

$$= \boxed{2x^4 + 1}$$

9. Multiply: $(x-5)(x^2+5x+25) = x^3 + \cancel{5x^2} + \cancel{25x} - \cancel{5x^2} - \cancel{25x} - 125$

$$= \boxed{x^3 - 125}$$

10. What is the slope of the line graphed below?



Two points $(0, -2), (3, 0)$

~~$(0, -2)$
 $(3, 0)$~~

$$m = \frac{(0) - (-2)}{(3) - (0)} = \frac{2}{3}$$

- A. $\frac{2}{3}$ B. $-\frac{2}{3}$ C. $\frac{3}{2}$ D. $-\frac{3}{2}$

11. Which of the following is a factor of the polynomial:

- A. $2b - 3x$ B. $3b + 2x$ C. $7a - 5y$ D. $7a + 2y$

12. Factor completely: $16a^2b - 100b^3$

$$\begin{aligned} 16a^2b - 100b^3 &= 4b(4a^2 - 25b^2) \\ &= \underline{4b(2a - 5b)(2a + 5b)} \end{aligned}$$

$$7a(3x+2b) - 5y(2b+3x)$$

$$21ax + 14ab - 10by - 15xy$$

$$= (3x+2b)(7a-5y)$$

13. Factor completely: $2x^2 - x - 55 = 2x^2 - 11x + 10x - 55$

Use ac method:

$$\left. \begin{array}{l} \text{Product} = -100 \\ \text{Sum} = -1 \end{array} \right\} -11, 10$$

$$= x(2x - 11) + 5(2x - 11)$$

$$= \underline{(2x - 11)(x + 5)}$$

14. Which of the following is the graph of the equation?

x	y
0	-5
3	0

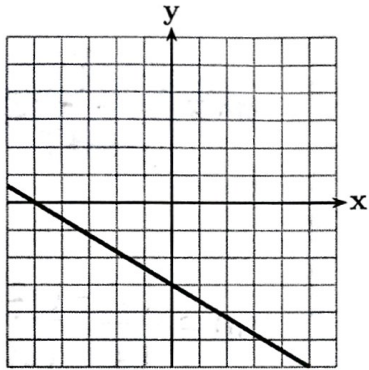
$$5x - 3y = 15$$

$$x=0 \Rightarrow -3y = 15$$

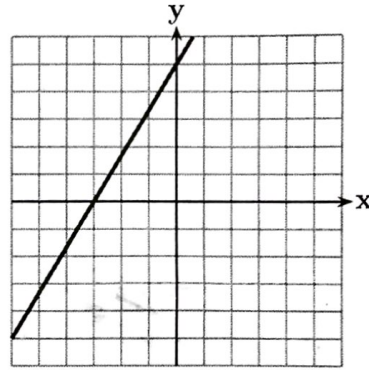
$$\Rightarrow y = -5$$

$$y=0 \Rightarrow 5x = 15$$

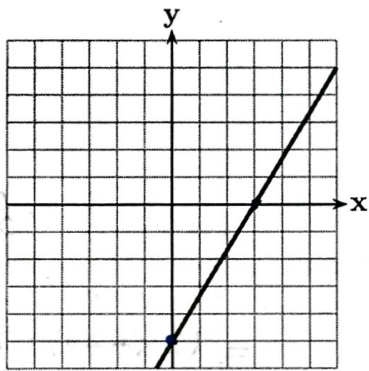
$$\Rightarrow x = 3$$



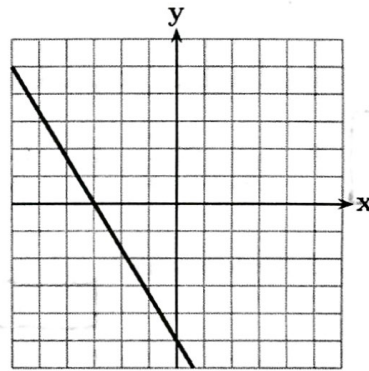
(A)



(B)



(C)



(D)

Border Point

Product 12 } -3, -4
Sum -7 }

15. Which of the following is a factor of the polynomial $2x^2 - 7x + 6$

- A. $3x - 2$ B. $2x + 3$ **C. $x - 2$** D. $x - 4$

$$-4x + 1 = -3x + 2$$

$$\Leftrightarrow -4x + 3x = 2 - 1$$

$$\Leftrightarrow -x = 1$$

$$\Leftrightarrow x = -1$$

16. Find the graph of the solution to the inequality.

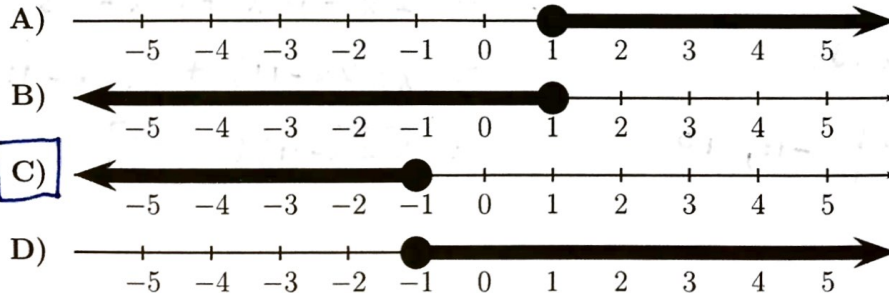
$$-4x + 1 \geq -3x + 2$$

Test Point

0

$$1 \geq 2$$

FALSE



$$2x^2 - 4x - 3x + 6$$

$$= 2x(x-2) - 3(x-2)$$

$$= (x-2)(2x-3)$$

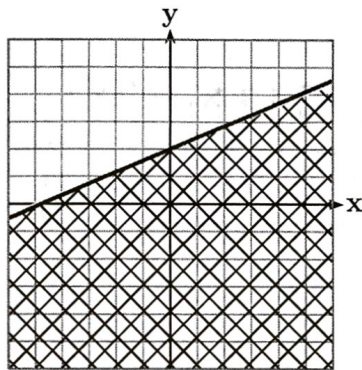
$$\Leftrightarrow 4y = 12 + 3x$$

$$\Leftrightarrow y = \underline{3} + \frac{3}{4}x$$

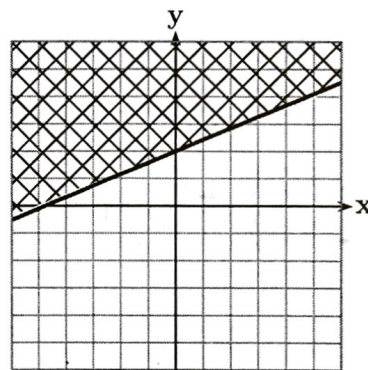
17. The graph of the line with equation $-3x + 4y = 12$ has

- A. Slope $\frac{3}{4}$ and y -intercept $(0, 12)$
- B. Slope $\frac{4}{3}$ and y -intercept $(0, 12)$
- C. Slope $-\frac{3}{4}$ and y -intercept $(0, 3)$
- D** Slope $\frac{3}{4}$ and y -intercept $(0, 3)$

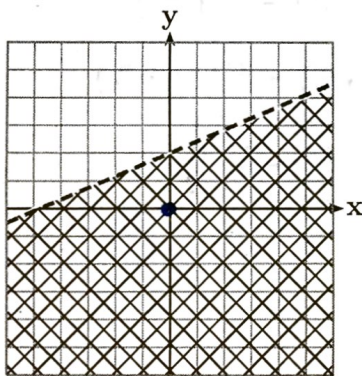
18. Find the graph of the solution to the inequality: $-2x + 5y < 10$



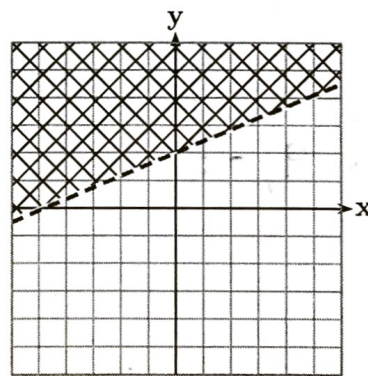
(A)



(B)



(C)



(D)

TEST POINT
 $(0, 0)$

$0 < 10$ TRUE

19. Simplify as much as possible: $2x(x - 3)^2 + 2x(x + 3)^2 - 3x(x^2 - 5x + 2)$

$$\begin{aligned} (x-3)^2 &= (x-3)(x-3) \\ &= x^2 - 3x - 3x + 9 \\ &= x^2 + 6x + 9 \end{aligned}$$

$$\begin{aligned} &= 2x(x^2 - 6x + 9) + 2x(x^2 + 6x + 9) - 3x(x^2 - 5x + 2) \\ &= 2x^3 - 12x^2 + 18x + 2x^3 + 12x^2 + 18x - 3x^2 + 15x^2 - 6x \\ &= \underline{\underline{x^3 + 15x^2 + 30x}} \end{aligned}$$

$$\begin{aligned} (x+3)^2 &= (x+3)(x+3) \\ &= x^2 + 3x + 3x + 9 \\ &= x^2 + 6x + 9 \end{aligned}$$

20. What is the value of the x -coordinate of the solution to the following system of equations?

$$\begin{cases} 5x + y = 17 \\ -2x - 2y = -2 \end{cases} \quad \begin{array}{r} 10x + 2y = 34 \\ \underline{-2x - 2y = -2} \\ \hline 8x = 32 \Rightarrow x = 4 \end{array}$$

- A. $x = 4$ B. $x = -4$ C. $x = 16$ D. $x = -16$

21. A line has slope -3 and passes through the point $(0, 4)$. Find its equation.

$$y = -3x + 4$$

22. Factor completely: $2x^3 - 6x^2 - 56x = 2x(x^2 - 3x - 28)$

Product -28 } $-7, 4$
Sum -3 }

$$= 2x(x-7)(x+4)$$

23. Factor completely: $3y^2 + 4y - 15 = 3y^2 + 9y - 5y - 15$

ac method

Product -45 } $9, -5$
Sum 4 }

$$= 3y(y+3) - 5(y+3)$$

$$= (y+3)(3y-5)$$

24. Factor completely: $\underline{ax + 2az - aw} - \underline{bx - 2bz + bw}$

$$= a(x+2z-w) - b(x+2z-w)$$

$$= (x+2z-w)(a-b)$$

25. Multiply: $(x^2 - 4x + 4)(x^2 + 4x + 4)$ ~~$x^4 + 4x^3 + 4x^2 + 4x^3 + 16x^2 + 16x + 4x^2 + 16x + 16$~~

$$= x^4 + \cancel{4x^3} + 4x^2 - \cancel{4x^3} - 16x^2 - \cancel{16x} + 4x^2 + \cancel{16x} + 16$$

$$= \boxed{x^4 - 8x^2 + 16}$$

26. (8 points) Extra Credit: Factor completely: $6x^2y^2 - xy^2 - y^2 - 24x^2 + 4x + 4$

$$y^2(6x^2 - x - 1) - 4(6x^2 - x - 1) = (6x^2 - x - 1)(y^2 - 4)$$

$$= \boxed{(2x-1)(3x+1)(y-2)(y+2)}$$

Factoring $6x^2 - x - 1 = 6x^2 - 3x + 2x - 1$

Product	-6	}	-3, 2	}	$= 3x(2x-1) + 1 \cdot (2x-1)$
Sum	-1				