BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 05 — Exam 3
Nikos Apostolakis — October 24, 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 $a = 2$ and $b = -3$, evaluate the expression given below.

$$a^2b + ab + b^2 = (2)^2(-3) + (2)(-3) + (-3)^2$$
$$= (4)(-3) + (2)(-3) + (9)$$
$$= -12 + (-6) + 9 = -9$$

A. -15 **B. -9** C. 3 D. 27

2. Given $a = -4$, $b = -5$, and $c = -1$, evaluate the expression given below.

$$b^2 - 4ac = (-5)^2 - 4(-4)(-1)$$
$$= 25 - (16)(-1)$$
$$= 25 - (16) = 9$$

A. -9 **B. 9** C. 41 D. -41

3. Solve for x:

LCD = 6

$$\frac{2x}{3} + \frac{1}{2} = \frac{5}{6} \iff 4x + 3 = 5 \iff 4x = 2 \iff x = \frac{1}{2}$$

A. $x = \frac{1}{2}$ B. $x = \frac{2}{3}$ C. $x = \frac{3}{2}$ D. $x = 2$

4. Solve for x: $z = 5x + y \iff z - y = 5x \iff \frac{z-y}{5} = x$

A. $x = \frac{z+y}{5}$ **B. $x = \frac{z-y}{5}$** C. $x = \frac{z}{5} - y$ D. $x = 5(z - y)$

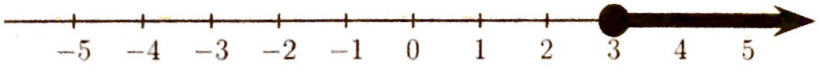
5. Find the graph of the solution to the inequality.

Border Point:
$-x + 3 = 2x - 6 \iff 6 + 3 = 2x + x$
$\iff 9 = 3x$
$\iff x = 3$

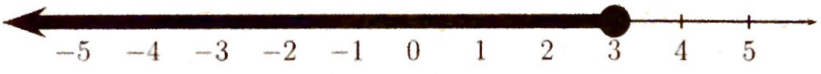
TEST POINT
$x = 0$

$-x + 3 \le 2x - 6$
$+3 \le -6$ FALSE

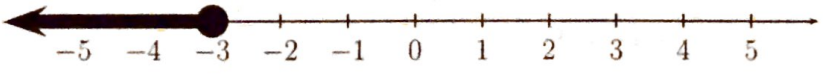
A)



B)

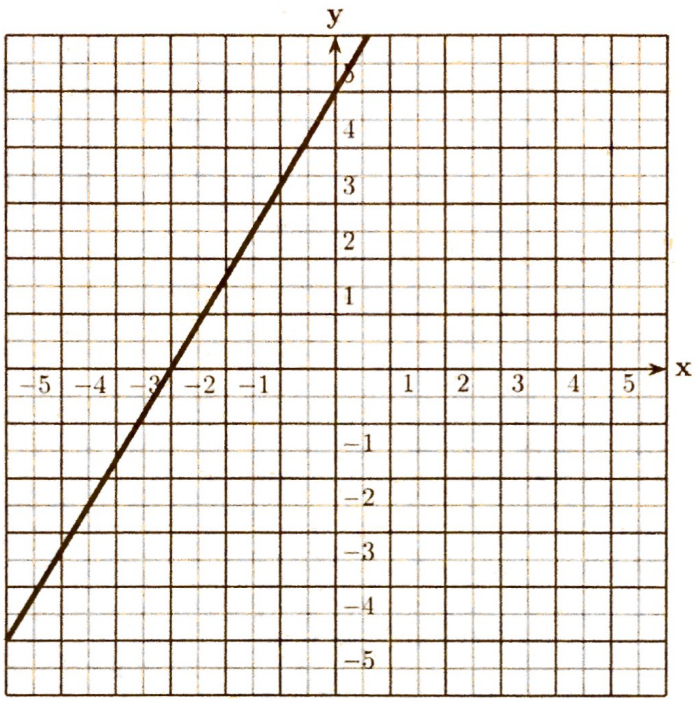


~~C)~~



~~D)~~

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



$(-3,0)$
$(0,5)$

$$m = \frac{(5)-(0)}{(0)-(-3)} = \frac{5}{3}$$

7. Find the slope and the x– and y–intercepts of the line with equation $4x - 3y = 24$.

x	y
0	−8
6	0

$x = 0 \Rightarrow -3y = 24$

$\Rightarrow y = -8$

y-intercept: $(0,-8)$

$y = 0 \Rightarrow 4x = 24$

$\Rightarrow x = 6$

x-intercept: $(6,0)$

Slope $m = \dfrac{(0)-(-8)}{(6)-(0)} = \dfrac{\cancel{8}^{4}}{\cancel{6}_{3}} = \dfrac{4}{3}$

8. A line has slope $-\frac{3}{2}$ and passes through the point $(0, 2)$. Find it's equation.

↳ this is the y-intercept.

$$y = -\frac{3}{2}x + 2$$

9. A line has slope $\frac{2}{3}$ and passes through the point $(6, -4)$. Find its equation.

If $(0,b)$ is the intercept the equation is

$y = \frac{2}{3}x + b$. Pluging $x=6, y=-4$ we get

$-4 = \frac{2}{3}(6) + b \iff -4 = 4 + b$

$\iff -8 = b$

So the equation of the line is $\boxed{y = \frac{2}{3}x - 8}$

10. A line passes through the points with coordinates $(2, -3)$ and $(-1, 3)$. Find its equation.

The slope is $m = \frac{(3)-(-3)}{(-1)-(2)} = \frac{6}{-3} = -2.$

If $(0,b)$ is the y-intercept eq. is: $y = -2x + b$

Plug in $(-1,3)$: $3 = -2(-1) + b \iff 3 = 2 + b$

$\iff 1 = b$

So equation is $\boxed{y = -2x + 1}$

11. A vertical line passes through the point $(2, -3)$. Find it's equation.

$\boxed{x = 2}$

12. A horizontal line passes through the point $(-5, -1)$. Find it's equation.

$\boxed{y = -1}$

13. Find the slope and the y intercept of the graph of the equation $4x + 3y = -6$

$\Leftrightarrow 3y = -4x - 6$

$\Leftrightarrow y = \dfrac{-4x-6}{3}$

$\Leftrightarrow y = -\dfrac{4}{3}x - \dfrac{6}{3}$

$\Leftrightarrow y = -\dfrac{4}{3}x - 2$

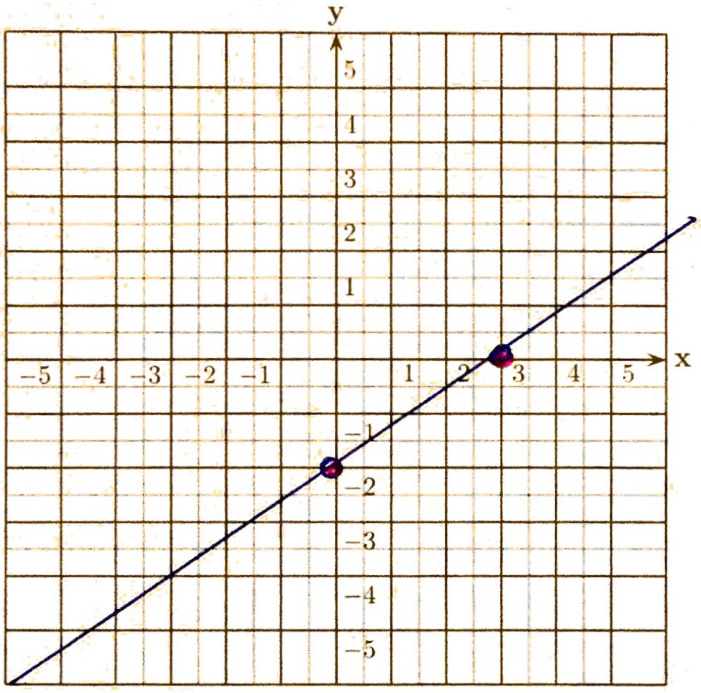
A. slope$= \dfrac{4}{3}$ and y-intercept $(0, -2)$

B. slope$= \dfrac{3}{4}$ and y-intercept $(0, -6)$

C. slope$= -\dfrac{4}{3}$ and y-intercept $(0, -2)$

D. slope$= -\dfrac{3}{4}$ and y-intercept $(0, -6)$

14. Graph the line with equation $2x - 3y = 6$ in the following grid.



x	y
0	−2
3	0

$x = 0 \Rightarrow -3y = 6$

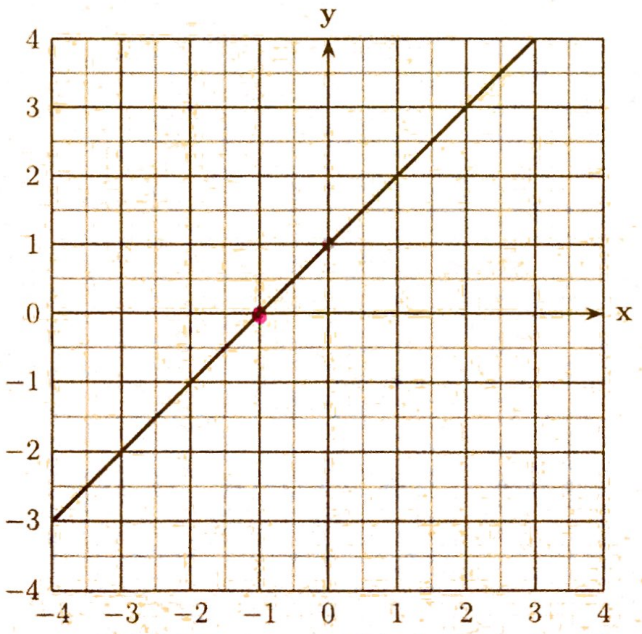
$\Rightarrow y = -2$

$y = 0 \Rightarrow 2x = 6$

$\Rightarrow x = 3$

15. Choose the correct equation for the line whose graph is shown below:

$(-1, 0)$
$(0, 1)$



A. $x - y = 1$

x	y
0	−1
1	0

✗

B. $x + y = 1$

x	y
0	1
1	0

✗

C. $x + y = -1$

x	y
0	−1
−1	0

✗

D. $x - y = -1$

x	y
0	1
−1	0

✓

16. Complete the following table of solutions for the equation $-2x + 5y = 10$.

$x = 0 \Rightarrow 5y = 10$

$\Rightarrow y = 2$

$y = 0 \Rightarrow -2x = 10$

$\Rightarrow x = -5$

$x = 5 \Rightarrow -2 \cdot 5 + 5y = 10$

$\Rightarrow -10 + 5y = 10$

$\Rightarrow 5y = 20$

$\Rightarrow y = 4$

x	y
0	2
-5	0
5	4
-15	-4
$-\frac{15}{2}$	-1

$x = -15 \Rightarrow -2(-15) + 5y = 10$

$\Rightarrow 30 + 5y = 10$

$\Rightarrow 5y = -20$

$\Rightarrow y = -4$

$y = -1 \Rightarrow -2x + 5(-1) = 10$

$\Rightarrow -2y + 5 = 10$

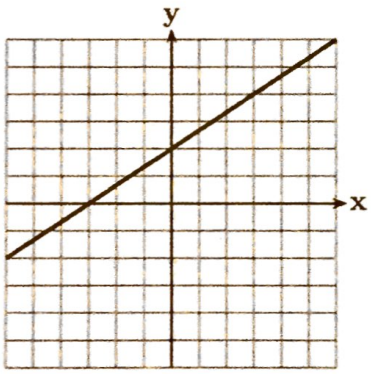
$\Rightarrow -2y = 15$

$\Rightarrow y = -\frac{15}{2}$

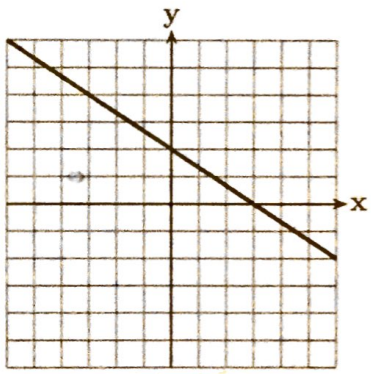
17. Which of the following is the graph of the equation?

$$2x + 3y = 6$$

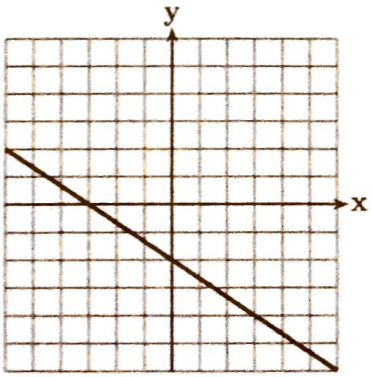
x	y
0	2
3	0



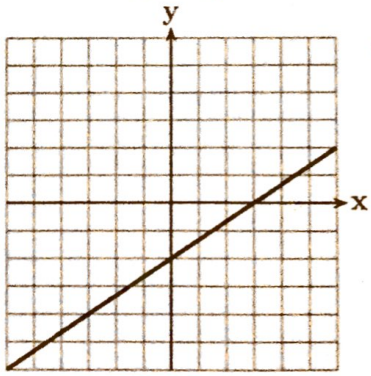
(A)



(B)



(C)



(D)

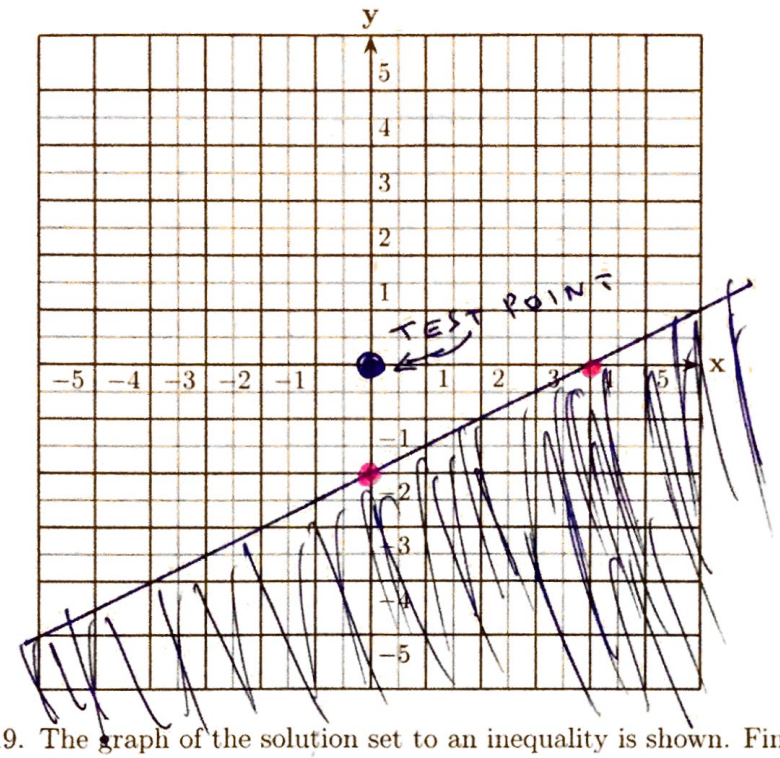
Border line

x	y
0	-2
4	0

Test point (0,0)

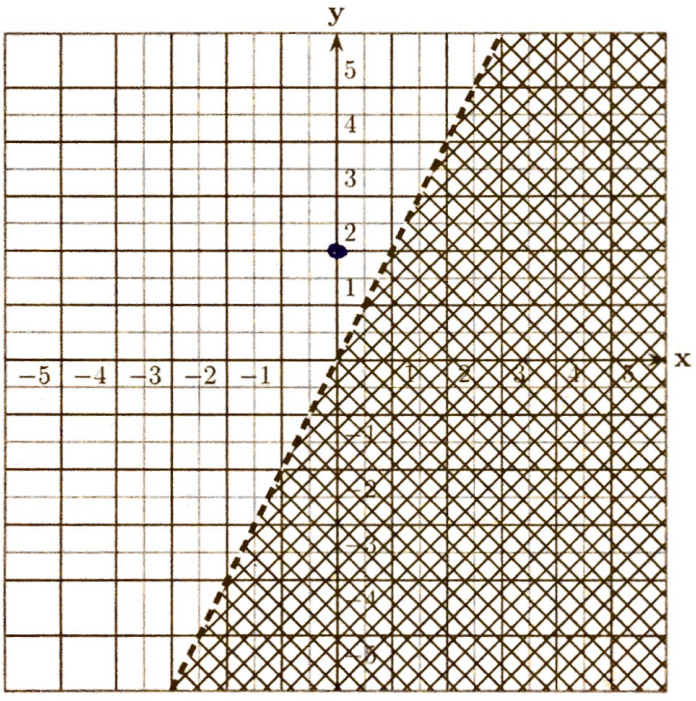
$0 \geq 4$ FALSE

18. Graph the inequality $x - 2y \geq 4$ in the following grid:



19. The graph of the solution set to an inequality is shown. Find the inequality.

USE TEST POINT (0,2)



~~A.~~ $y \geq 2x$

~~B.~~ $y > 2x$ $2 > 0$ (T)

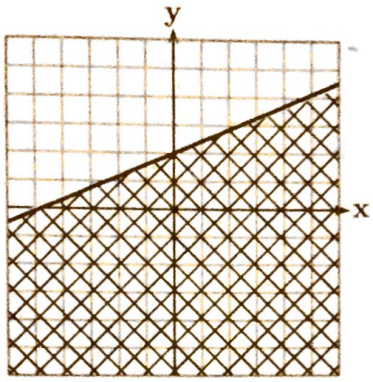
~~C.~~ $y \leq 2x$

D. $y < 2x$ $2 < 0$ (F)

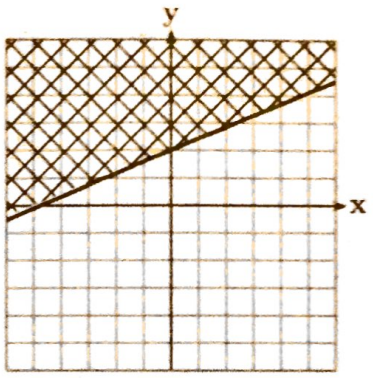
$0 < 10$ TRUE

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

TEST POINT
(0, 0)



(A)



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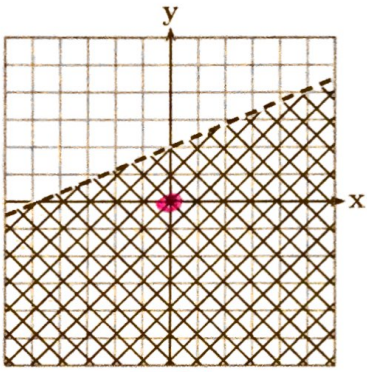
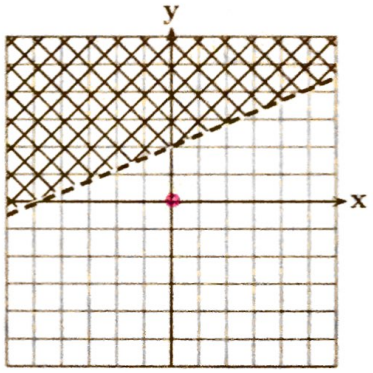
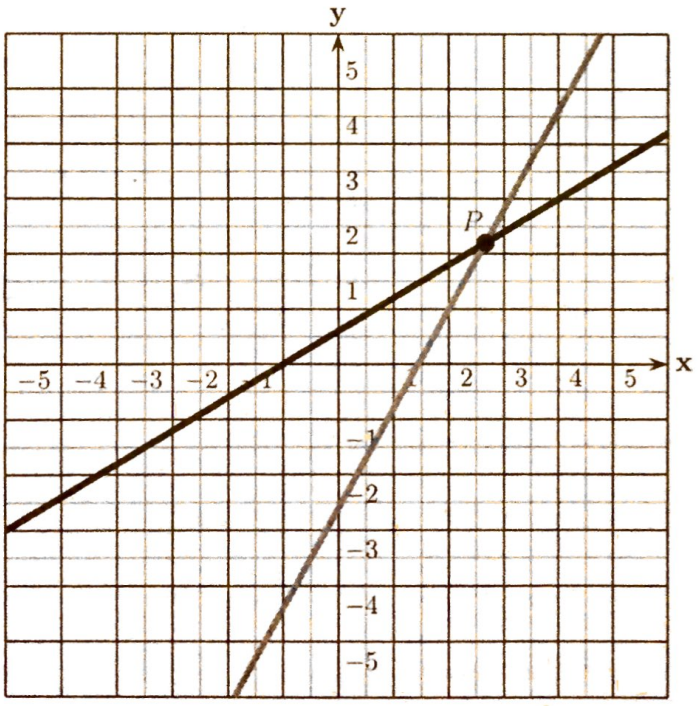


(C)



(D)

21. The graphs of the lines with equations $3x - 5y = -3$, and $9x - 5y = 13$ are shown bellow. What are the coordinates of the point P?



$-3x + 5y = 3$
$9x - 5y = 13$

$6x = 16$

$\Rightarrow x = \frac{16}{6}$

$\Rightarrow x = \frac{8}{3}$

$-3 \begin{cases} 3x - 5y = -3 \\ 9x - 5y = 13 \end{cases} (-1)$

$-9x + 15y = 9$
$9x - 5y = 13$

$10y = 22$

$\Rightarrow y = \frac{22}{10}$

Answer: $\left(\frac{8}{3}, \frac{22}{10}\right)$.

22. What is the value of the ~~x~~ y-coordinate of the solution to the following system of equations?

$$\begin{cases} x - 3y = 8 \\ -3x + 8y = -25 \end{cases}$$

$3x - 9y = 24$
$-3x + 8y = -25$
$-y = -1 \Rightarrow y = 1$

A. $y = -3$ B. $y = -1$ C. $y = 3$ **D. $y = 1$**

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

$$\begin{cases} 2x - y = 15 \\ -5x + 3y = -35 \end{cases}$$

$6x - 3y = 45$
$-5x + 3y = -35$
$x = 10$

A. $x = 5$ B. $x = -10$ **C. $x = 10$** D. $x = -5$

24. The sum of the coordinates of the solution system $\begin{cases} 2x + 5y = 25 \\ -5x - 3y = -15 \end{cases}$ is:

A. 10 **B. 5** C. 0 D. -5

25. Solve the system: $\begin{cases} 3x + 4y = 6 \\ 4x - 3y = -17 \end{cases}$

$-12x - 16y = -24$
$12x - 9y = -51$
$-25y = -75$
$\Rightarrow y = 3$

$9x + 12y = 18$
$16x - 12y = -68$
$25x = -50$
$\Rightarrow x = -2$

So the answer is $(-2, 3)$.

$10x + 25y = 125$
$-10x - 6y = -30$
$19y = 95$
$\frac{19y}{19} = \frac{95}{19}$
$\Rightarrow \boxed{y = 5}$

$6x + 15y = 75$
$-25x - 15y = -75$
$-21x = 0$
$\Rightarrow \boxed{x = 0}$

So $x + y = 5$