

**Math 129 - Test 2B**

March 11, 2020

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations where necessary. Label your axes when graphing.

1. (2 points [7,11]) The equation  $(x^3 + 1)^2 - 11(x^3 + 1) + 10 = 0$  is "quadratic in form." What  $u$ -substitution will reduce the equation to quadratic? Do not solve the equation.

$$u = x^3 + 1$$

THIS MAKES  $u^2 - 11u + 10 = 0$

2. (5 points [11]) Solve for  $t$ :  $(3t + 5)^{3/2} - 3 = 24$

$$27^{2/3} = (3\sqrt{27})^2 = 3^2 = 9$$

$$(3t + 5)^{3/2} = 27$$

$$3t + 5 = 27^{2/3}$$

$$3t + 5 = 9$$

$$3t = 4$$

$$t = \frac{4}{3}$$

3. (5 points [11]) Solve for  $x$ :  $\sqrt[3]{2x + 3} + 7 = 10$

$$\sqrt[3]{2x + 3} = 3$$

$$2x + 3 = 27$$

$$2x = 24$$

$$x = 12$$

4. (3 points [11]) Solve for  $v$ :  $(2v - 3)^{1/4} = -1$

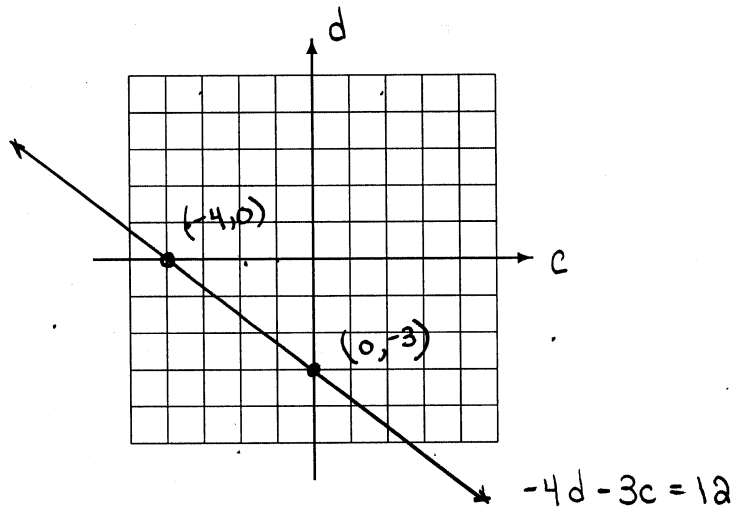
$$\sqrt[4]{2v - 3} = -1$$

No solution

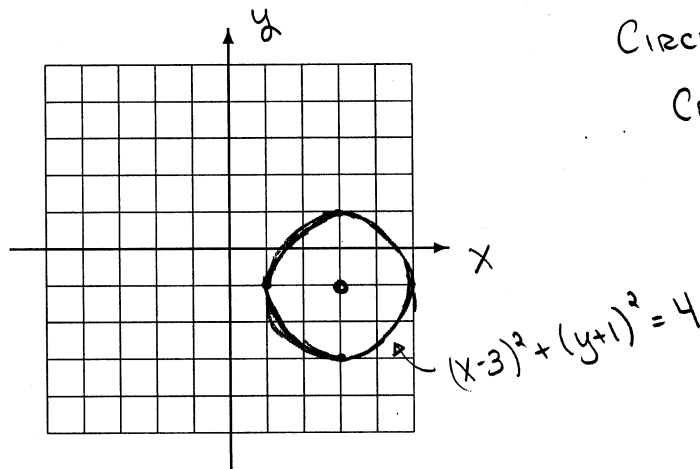
EVEN-INDEXED  
RADICAL CANT  
BE NEGATIVE.

5. (6 points [2,4]) Find two solutions of the equation  $-4d - 3c = 12$ . Plot your solutions as ordered pairs, and then sketch the graph of the equation. Label your axes.

c	d
0	-3
-4	0



6. (4 points [9,10]) Sketch the graph of the equation  $(x - 3)^2 + (y + 1)^2 = 4$ .



CIRCLE RADIUS = 2  
 CENTER = (3, -1)

7. (5 points [2,3,4]) The line  $L$  passes through the points  $(7, 3)$  and  $(-5, 3)$ . Find an equation of the line perpendicular to  $L$  and passing through  $(8, 9)$ .

$L$  IS THE HORIZONTAL LINE  
 $y = 3.$

A PERPENDICULAR LINE IS  
 VERTICAL, AND  
 PASSING THROUGH  
 $(8, 9) \dots$

$x = 8$

8. (9 points [9,10]) The points (2,1) and (-6,4) are the endpoints of a diameter of a circle.

(a) Find the center of the circle.

$$\left( \frac{2+(-6)}{2}, \frac{1+4}{2} \right) = \left( -\frac{4}{2}, \frac{5}{2} \right)$$

$$= \boxed{\left( -2, \frac{5}{2} \right)}$$

(b) Compute the length of the diameter.

$$d = \sqrt{(-6-2)^2 + (4-1)^2}$$

$$= \sqrt{64+9} = \boxed{\sqrt{73}}$$

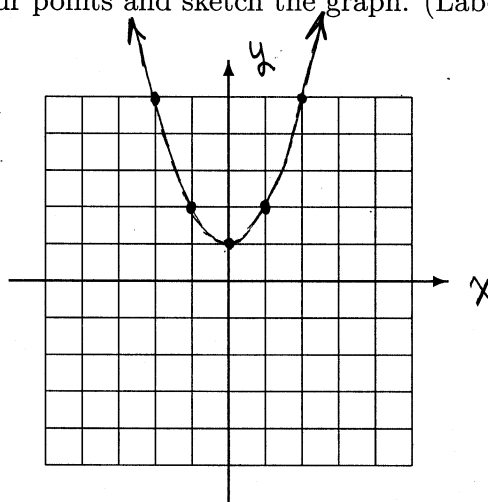
(c) Write the standard form equation for the circle.

$$(x+2)^2 + \left(y - \frac{5}{2}\right)^2 = \left(\frac{\sqrt{73}}{2}\right)^2$$

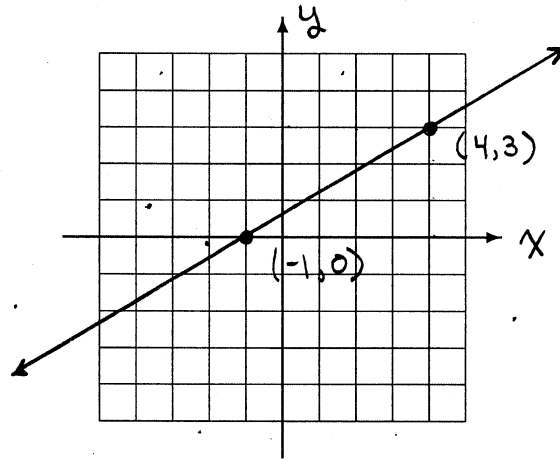
$$\text{or } \boxed{(x+2)^2 + \left(y - \frac{5}{2}\right)^2 = \frac{73}{4}}$$

9. (6 points [1,9,10]) Make a table that shows five points on the graph of the equation  $y = x^2 + 1$ . Then plot your points and sketch the graph. (Label your axes.)

x	y
0	1
-1	2
1	2
2	5
-2	5



10. (6 points [2,4]) A line with slope  $\frac{3}{5}$  passes through the point  $(4, 3)$ . Use the point and slope to graph the line. Briefly explain how you did so. (Label your axes.)

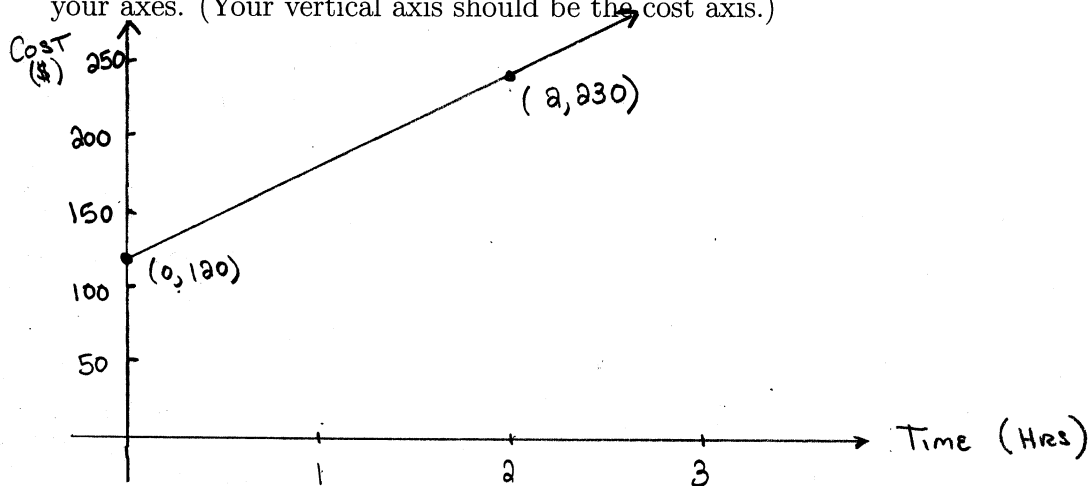


$$\frac{3}{5} = \frac{\text{RISE}}{\text{RUN}}$$

I USED  $\frac{-3}{-5}$  AND  
WENT 3 DOWN &  
5 LEFT FROM  $(4, 3)$

11. (8 points [2,3,4]) Bartle's Heating and Cooling charges a flat fee of \$120 to make a house call, but then charges a constant hourly rate on top of that. A technician recently made a house call to fix a furnace and ended up billing the client \$230 after 2 hours of work.

- (a) Sketch the graph that shows client cost (in dollars) versus time (in hours). Label your axes. (Your vertical axis should be the cost axis.)



- (b) Which single word or phrase in the problem situation indicates that the graph should be a line?

CONSTANT HOURLY RATE

- (c) Compute the slope of the graph. What does the slope of the graph represent?

$$\frac{230 - 120}{2 - 0} = \frac{110}{2} = \boxed{55} \Rightarrow$$

Hourly rate  
\$55.

12. (4 points [2,3,4]) Determine equations of the horizontal and vertical lines that pass through  $(7, -2)$ . Label which is which.

HORIZONTAL  
 $y = -2$

VERTICAL  
 $x = 7$

13. (6 points [2,4]) Find an equation of the line that passes through the points  $(1, 8)$  and  $(-4, -2)$ . Write your final answer in slope-intercept form.

$$m = \frac{8 - (-2)}{1 - (-4)} = \frac{10}{5} = 2$$

POINT  $(1, 8) \rightarrow y - 8 = 2(x - 1)$

$$y - 8 = 2x - 2$$

$y = 2x + 6$

14. (3 points [9,10]) The graph of the equation  $x^2 + y^2 = 1$  is a circle. Determine the center and radius of the circle.

$$(x - 0)^2 + (y - 0)^2 = 1^2$$

$(h, k) = \text{CENTER} = (0, 0)$

$r^2 = 1^2 \Rightarrow \text{RADIUS} = 1$

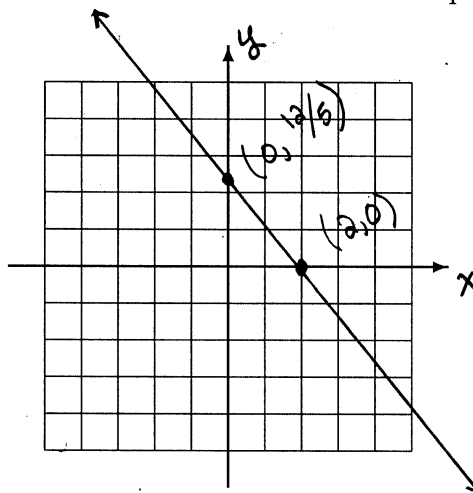
15. (6 points [3]) Find the  $x$ - and  $y$ -intercepts of the line described by  $6x + 5y = 12$ . Then sketch the graph of the line. Label the axes and the intercepts.

X-INT...

$$y = 0 \Rightarrow 6x = 12$$

$$\Rightarrow x = 2$$

$(2, 0)$  X-INT



y-INT...

$$x = 0 \Rightarrow 5y = 12$$

$$\Rightarrow y = \frac{12}{5}$$

$(0, \frac{12}{5})$  Y-INT

$6x + 5y = 12$

16. (8 points [11]) Solve for  $w$ :  $\sqrt{3w+9} + 7 = w + 10$

$$\sqrt{3w+9} = w+3$$

$$3w+9 = (w+3)^2$$

$$3w+9 = w^2+6w+9$$

$$0 = w^2+3w$$

$$w(w+3) = 0$$

$$w = 0 \text{ or } w = -3$$

BOTH CHECK OUT!

17. (6 points [2,3,4]) An event planner is determining the cost to host a party at a certain venue. For 100 people, the cost is \$1755.00, and for 150 people, the cost is \$2242.50. Assume that the number of people and the cost satisfy a linear equation. Find that linear equation. Write your final answer in slope-intercept form.

People, x	Cost, y
100	1755
150	2242.5

$$m = \frac{2242.5 - 1755}{150 - 100} = \frac{487.50}{50} = 9.75$$

$$y - 1755 = 9.75(x - 100)$$

or

$$y = 9.75x + 780$$

18. (8 points [2,4]) Find an equation of the line that passes through the point  $(-2, 7)$  and is parallel to the line described by  $6x - 3y = 8$ . Write your final answer in standard form.

$$6x - 3y = 8$$

$$-3y = -6x + 8$$

$$y = 2x - \frac{8}{3}$$

$$m = 2$$

$$m_{\text{parallel}} = 2$$

$$\text{Slope} = 2$$

$$\text{Point } (-2, 7)$$

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

$$y - 7 = 2x + 4$$

$$-2x + y = 11$$