

Math 129 - Test 1B

February 19, 2020

Name key Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (4 points [3]) Which of these equations ARE linear equations? Circle all that apply.

$$\frac{x+5}{6} + 3 = \frac{x}{7}$$

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

$$(3x+2)^{3/2} = 4,$$

↑
RATIONAL
EXP.

$$3x(x-8) = x$$

↑
QUADRATIC

2. (3 points [3]) Solve for x : $3(x-2) + 4x = 3(x+5) + 11$

$$3x - 6 + 4x = 3x + 15 + 11$$

$$7x - 6 = 3x + 26$$

$$4x = 32$$

$$x = 8$$

3. (3 points [3]) Solve for y : $\frac{3y-6}{-7} = 6$

$$3y - 6 = -42$$

$$3y = -36$$

$$y = -12$$

4. (4 points [3]) Yesterday, David rode his bike at the speed of 15 miles per hour. Today, he rode at 12 miles per hour. In the two days, he biked for a combined total time of 7 hours. Let x be the number of hours he biked yesterday. Write an algebraic expression in terms of the single variable x that gives the total number of miles he biked in the two days. (Remember that *distance equals rate times time*.)

$$x = \text{HOURS BIKED YESTERDAY} \Rightarrow 15x = \text{MILES BIKED YESTERDAY}$$

$$7-x = \text{HOURS BIKED TODAY} \Rightarrow 12(7-x) = \text{MILES BIKED TODAY}$$

↑
TOTAL OF 7 HOURS.

$$\text{TOTAL MILES} = 15x + 12(7-x)$$

$$= 84 + 3x$$

5. (3 points [3]) Solve for w : $6w - (7 - 2w) = 4(w - 2) + 4w + 1$

$$6w - 7 + 2w = 4w - 8 + 4w + 1$$

$$8w - 7 = 8w - 7$$

Identity.

All #'s ARE SOLUTIONS.

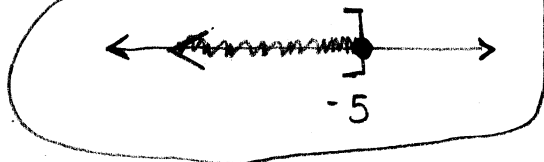
6. (5 points [3]) Solve for x . Write your solution set in interval notation, and graph it on a number line.

$$6 - 9x \geq 51$$

$$-9x \geq 45$$

$$x \leq -5$$

$$(-\infty, -5]$$



7. (5 points [3]) Solve for y . Write your solution set in interval notation, and graph it on a number line.

$$8y + 14 < 2(3 + 2y) + 7y$$

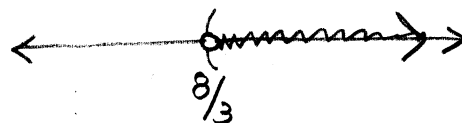
$$8y + 14 < 6 + 4y + 7y$$

$$8y + 14 < 6 + 11y$$

$$8 < 3y$$

$$y > \frac{8}{3}$$

$$(\frac{8}{3}, \infty)$$



8. (3 points [3]) Solve for x : $5x + 9 > \frac{5}{2}(4 + 2x)$

$$5x + 9 > \frac{20}{2} + \frac{10x}{2}$$

$$5x + 9 > 10 + 5x$$

$$9 > 10$$

Never True!

No solution

9. (6 points [3]) Solve for y . Write your solution set in interval notation, and graph it on a number line.

$$3(y - 4) + 2y < 3 \quad \text{and} \quad 7 - 2y \leq 13$$

$$3y - 12 + 2y < 3 \quad -2y \leq 6$$

$$5y < 15$$

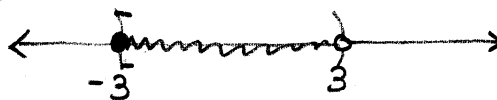
$$y \geq -3$$

AND

$$y < 3$$

$$-3 \leq y < 3$$

$$[-3, 3)$$



10. (4 points [3]) Kate sells her craft hot sauce at the local farmer's market. It costs her \$120 to rent a booth, and she sells the sauce for \$9 per bottle. Let b represent the number of bottles that Kate will sell. Suppose she would like to take home at least \$500. Write an inequality involving b that Kate could solve to determine the numbers of bottles she must sell.

$$9b - 120 \geq 500$$

$$(\text{Amount From Sauce}) - (\text{Rent}) = \text{At least } \$500$$

11. (2 points [11]) Solve for t : $|2t + 1| = -5$

ABS. VALUE CANNOT BE NEGATIVE.

No solution

12. (4 points [11]) Solve for x : $-4|3x - 1| + 1 = -7$

$$3x - 1 = 2 \quad \text{or} \quad 3x - 1 = -2$$

$$-4|3x - 1| = -8$$

$$3x = 3$$

$$3x = -1$$

$$|3x - 1| = 2$$

$$x = 1 \quad \text{or} \quad x = -\frac{1}{3}$$

13. (6 points [11]) Solve for x . Write your solution set in interval notation, and graph it on a number line.

$$|8 - 2x| \geq 6$$

$$8 - 2x \leq -6$$

or

$$8 - 2x \geq 6$$

$$-2x \leq -14$$

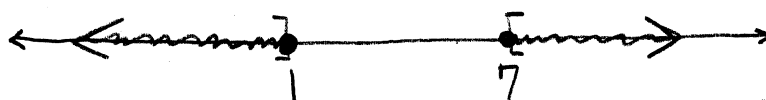
$$-2x \geq -2$$

$$x \geq 7$$

or

$$x \leq 1$$

$$(-\infty, 1] \cup [7, \infty)$$



14. (4 points [7,12]) Write as a complex number in standard form: $\frac{5+2i}{3-i}$

$$\frac{5+2i}{3-i} \cdot \frac{3+i}{3+i} = \frac{(5+2i)(3+i)}{(3-i)(3+i)} = \frac{15+11i+2i^2}{9-i^2} =$$

$$\frac{13+11i}{10}$$

15. (3 points [7,12]) Write as a complex number in standard form: i^{27}

$$i^{27} = i^{24} i^3 = 1 \cdot i^3 = -i$$

16. (3 points [7]) Solve for x : $3(2x-3)(5x+1) = 0$

$$2x-3=0 \text{ or } 5x+1=0$$

$$x = \frac{3}{2} \text{ or } x = -\frac{1}{5}$$

17. (4 points [7]) Solve for x : $x^2 = 24 - 2x$

$$x^2 + 2x - 24 = 0$$

$$(x+6)(x-4) = 0$$

$$x = -6 \text{ or } x = 4$$

18. (3 points [6]) Complete the square: $x^2 + 8x + 10$

$$\frac{8}{2} = 4$$

$$(x+4)^2 - 16 + 10$$

$$\text{or } (x+4)^2 - 6$$

19. (5 points [7]) Solve for x . Write your solution(s) in exact form, simplified as much as possible.

$$3x^2 - 2x + 1 = 0$$

$$\sqrt{8} = 2\sqrt{2}$$

$$a=3, b=-2, c=1$$

$$x = \frac{2 \pm \sqrt{4 - 4(3)(1)}}{2(3)} = \frac{2 \pm \sqrt{-8}}{6} = \frac{2 \pm 2\sqrt{2}i}{6}$$

$$= \frac{1 \pm \sqrt{2}i}{3}$$

20. (6 points [7]) A ball is thrown from a height of 80 meters with an initial downward velocity of 4 meters per second. The height of the ball (in meters) after t seconds is given by $h = 80 - 4t - 4.9t^2$. When does the ball hit the ground? Round your answer to the nearest hundredth.

$$h = 0$$

$$80 - 4t - 4.9t^2 = 0$$

$$a = -4.9, b = -4, c = 80$$

$$t = \frac{4 - \sqrt{1584}}{-9.8} \approx 3.65 \text{ sec}$$

$$t = \frac{4 \pm \sqrt{16 - 4(-4.9)(80)}}{2(-4.9)} = \frac{4 \pm \sqrt{1584}}{-9.8}$$

21. (3 points [7]) Use the discriminant to determine a value for c so that the equation has exactly one real solution.

$$\text{Disc} = 0$$

$$3x^2 + 7x + c = 0$$

$$a=3, b=7, c=?$$

$$(7)^2 - 4(3)c = 0$$

$$49 - 12c = 0$$

$$49 = 12c$$

$$c = \frac{49}{12}$$

22. (3 points [1,11]) Determine the values of x that are restricted from the following expression:

$$\frac{x+7}{x^2-6x-7}$$

$$(x-7)(x+1) = 0$$

$$x = 7 \text{ or } x = -1$$

23. (4 points [3,7,11]) Solve for y : $\frac{5}{y-4} = \frac{8}{y}$

Cross multiply...

$$5y = 8(y-4)$$

$$5y = 8y - 32$$

$$-3y = -32$$

$$y = \frac{32}{3}$$

24. (6 points [3,7,11]) Solve for x : $\frac{6}{(x-1)(x-3)} = 1 + \frac{3}{x-3}$

Mult. by $(x-1)(x-3)$ to get

$$6 = (x-1)(x-3) + 3(x-1)$$

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

$$6 = x^2 - x$$

$$0 = x^2 - x - 6 = (x-3)(x+2)$$

~~$$x = 3$$~~

or

$$x = -2$$

MUST BE
EXCLUDED.

25. (4 points [11]) Solve for x . Round your answer(s) to the nearest hundredth.

$$(3x-2)^3 - 36 = 0$$

$$(3x-2)^3 = 36$$

$$3x-2 = \sqrt[3]{36}$$

$$3x = 2 + \sqrt[3]{36}$$

$$x = \frac{2 + \sqrt[3]{36}}{3} \approx 1.77$$