Math 129 - Final Exam B

December 11, 2019

Name _____

Score _____

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

1. (4 points [11]) Solve for r: $-3|7 - 2r| = -12$

2. (6 points [3]) Solve for w. Write your solution set in interval notation, and graph it on a number line.
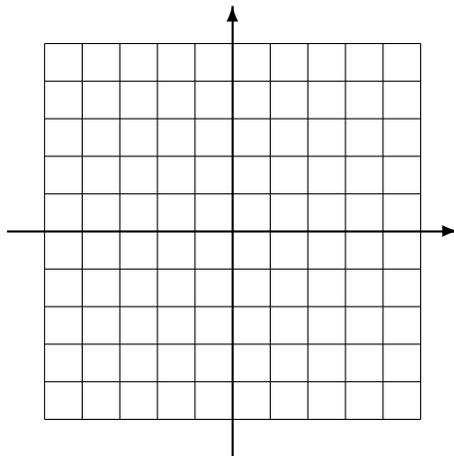
$$3(w + 1) - 5 < w + 8 \quad \text{and} \quad 10 - 3w \leq 1$$

3. (5 points [7]) Solve for x. Write your answer(s) in decimal form, rounded to the nearest hundredth.

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

4. (4 points [3,11]) Solve for x: $\dfrac{5}{x} = \dfrac{8}{2x-1}$

5. (6 points [3]) A line is described by the equation $\dfrac{8}{3}x - 4y = 4$. Find the x- and y-intercepts of the line. Then plot your intercepts and sketch the line.

6. (5 points [2,4]) The line L passes through the point $(6,4)$ and is perpendicular to the line given by $y = -2x + 1$. Find an equation for the line L. Write your final answer in standard form $(Ax + By = C)$.

7. (3 points [1]) Determine the domain of the function $f(x) = \dfrac{2(x-1)}{(2x+5)(x-3)}$.

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8. (4 points [2,4]) Determine the slope and y-intercept of the line described by $2x + y = 3$. Then graph the line.
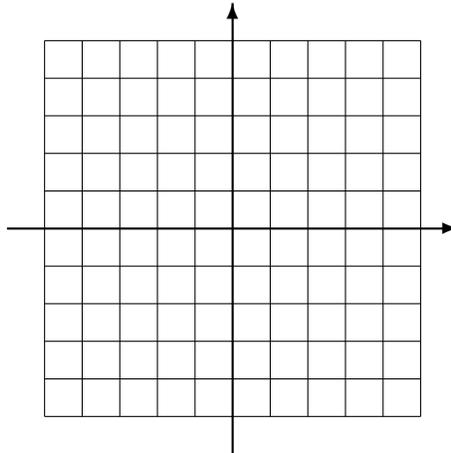
9. (4 points [2,3,4]) A street vendor will sell 240 ice cream cones if she sells them for $2 each, and she will sell 150 cones if she sells them for $3 each. Determine the linear equation that describes how the demand varies with cost. Say what your variables represent.

10. (6 points [5]) Let $g(x) = x^2 + 5x$. Expand and simplify the difference quotient $\dfrac{g(x + h) - g(x)}{h}$.

11. (7 points [8,9,10]) Let $f(x) = 2\sqrt{x+3} - 4$.

(a) Explain how the graph of f can be obtained from the graph of $y = \sqrt{x}$.

(b) Carefully sketch the graph of f.
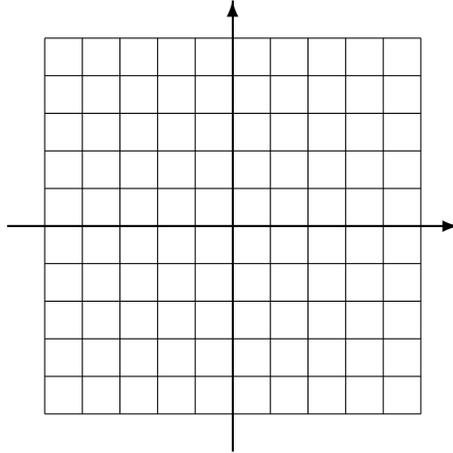
(c) Determine the domain and range of f.

12. (6 points [5]) Let $f(x) = 3 + \sqrt{x}$ and $g(x) = \begin{cases} x^2 + 4, & \text{if } x < -2 \\ 3x + 7, & \text{if } x > 0 \end{cases}$.

(a) Compute $g(-10)$.

(b) Compute $g(-1)$.

(c) Compute $(g \circ f)(9)$.

(d) If $h(x) = x^2 + 3$, then what function is $(h \circ f)(x)$? Completely expand and simplify your answer.

13. (12 points [11,12,13]) Consider the polynomial $f(x) = 3x(x-3)^2(x+2)^3$.

    (a) Determine the degree of f.

    (b) State the zeros of f and their corresponding multiplicities.

    (c) Describe the end behavior of the graph of f.

    (d) Determine the y-intercept.

    (e) Roughly sketch the graph of f. Be sure that your graph correctly illustrates the y-intercept, the end behavior, and the behavior at the x-intercepts.

    (f) Use your graph to solve $f(x) > 0$. Write your solution in interval notation.

14. (4 points [8]) The graph of $f(x) = (x - 4)^2 + 3$ is a parabola.

(a) Explain how the graph of f can be obtained from the graph of $y = x^2$.

(b) Determine the vertex and an equation for the axis of symmetry of the graph of f.

15. (8 points [13]) Let $f(x) = \dfrac{x^3 - 4x^2 + 8}{x^2 + 2x}$. Determine the slant asymptote and the vertical asymptotes of the graph of f.

16. (4 points [13]) Let $R(x) = \dfrac{x^3 + x^2}{7x(x + 3)(x - 9)}$.

(a) Determine any horizontal asymptotes of the graph of R.

(b) Explain why $x = 0$ is NOT a vertical asymptote of the graph of R.

17. (4 points [12])   Use synthetic division and the remainder theorem to evaluate $f(3)$ if $f(x) = 2x^2 - 4x + 5$.

18. (8 points [11,12,13])   Solve the inequality and write your solution in interval notation. Show all work.

$$\frac{(x-3)^2}{(x+4)(x-8)} \le 0$$