MA 135: College Algebra
Instructor: Justin Ryan
Review for Midterm Exam 1

How to use this handout—Complete all problems, showing enough work. Problems on the midterm exam will be similar to these in nature, but this review packet is **not** meant to be comprehensive. **You should still study your notes and review your homework**.

Important Announcement—You will not be allowed to use a calculator or any other electronic devices on the midterm exam. You will however be permitted to use one 3×5 in^2 note card of your own hand-written notes. If your paper is too large, I will cut it. If your notes are not hand-written (if there are pictures or typed portions), I will cut it.

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1. Give the equation of the line in slope-intercept form that passes through the point $(-6,7)$ and is parallel to the line $-6x+7y=43$.

2. Give the equation of the line in slope-intercept form that passes through the point $(7,3)$ and is perpendicular to $-7x+3y=-58$.

3. Find $f(0)$ given that

$$f(x) = \begin{cases} x-2 & \text{if } x < 5 \\ 9-x & \text{if } x \geq 5 \end{cases}.$$

4. Write the function in vertex form and describe how the graph of the function $y = f(x)$ can be obtained from that of the parent function $p(x) = x^2$.

$$f(x) = x^2 + 12x + 32$$

5. Solve the inequality $2x + 2 \geq 4$ and plot your solution on a number line.

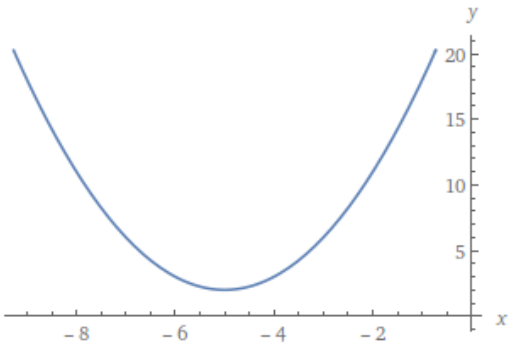
6. Determine whether the function is even, odd, or neither. What kind of symmetry does the graph of $y = f(x)$ have, if any?

$$f(x) = 8x^4 - 3x^2 + 3$$

7. Find the distance between the points $P(-4,4)$ and $Q(6,-3)$.

8. Find the midpoint of the line segment connecting the points $P(-4,4)$ and $Q(6,-3)$.

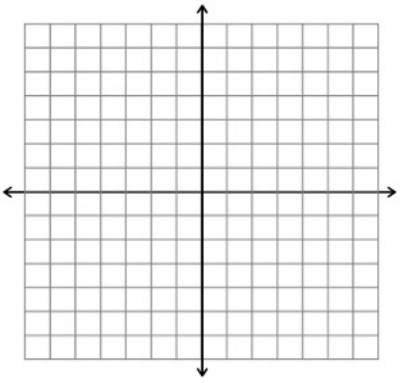
9. The following graph defines a function, $y = f(x)$. Use the graph to identify the parent function and all translations, then write an equation of the function. What are the domain and range of f?



10. The graph of $y = x^2$ is shifted 4 units to the left. This graph is then vertically stretched by a factor of 6 and reflected across the x-axis. Finally, the graph is shifted 7 units downward. Give an equation of the function defined by the resulting graph.

11. Graph the line. Clearly label the x- and y-intercepts (if they exist) and identify the slope of the line.

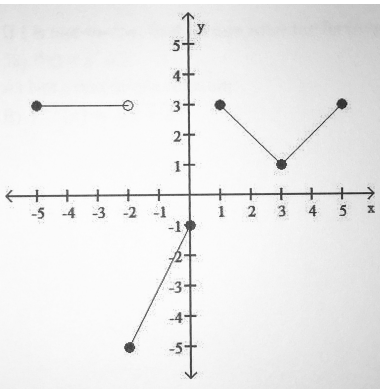
$$f(x) = -\tfrac{1}{2}x + 2$$



12. Determine whether the equation defines a circle. If it does, identify its center and radius.

$$x^2 - 10x + y^2 + 20y = -109$$

13–14. For problems 13 and 14, refer to the graph.



13. On what intervals is the function increasing, decreasing, and constant?

14. At what points is the graph discontinuous? What types of discontinuities does the graph have?

15. Determine the domain of the function. Identify and classify all points of discontinuity (hole, jump, asymptote).

$$f(x) = \frac{x^3 - 8}{x - 2}$$

16. Determine the domain of the function. Identify and classify all points of discontinuity.

$$f(x) = \frac{x^2 + 2x + 1}{x^2 - 1}$$

17. Write the function in vertex form and clearly identify all transformations of the parent graph, in the proper order.

$$f(x) = -2x^2 + 6x - \tfrac{13}{2}$$

18. The following graph defines a function, $y = f(x)$. Use the graph to identify the parent function and all transfomations (in order), then write an equation of the function. What are the domain and range of f?