MATH 1005: College Algebra
Spring 2019 – March 13
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In-Class Practice Midterm 2
Sections 1.4 to 1.6 & 2.1 to 2.8

*Show **all** of your work in the space provided. Clearly indicate your final answer.*

1. Use the quadratic formula to solve the quadratic equation $2x^2 + 4x + 5 = 0$.

$x = -1 + \frac{1}{2}\sqrt{6}\,i$ and $x = -1 - \frac{1}{2}\sqrt{6}\,i$

Page 126, Example 8

2. Solve the equation $3|x + 5| + 4 = -2$

No solution

since $|x+5| = -2$ has no solutions.

Try: $3|x+5| - 4 = 2$

Answer: $x = -7$ or $x = -3$

Page 159, Example 16

3. Solve the inequality $|2x - 4| + 4 \geq 10$

$(-\infty, -1] \cup [5, \infty)$

Page 161 Example 4

and Pag 162 Example 6

4. Solve the rational inequality using the test point method. Write you final answer in interval notation.
$$\frac{x^2 - 2x - 15}{x - 3} \geq 0$$

$[-3, 3) \cup [5, \infty)$

Page 152 , Example 10
(Also see lecture notes on 1.6)

5. Consider the points $P = (4, 6)$ and $Q = (1, -5)$.

(a) Find the distance between P and Q.

$\sqrt{(3)^2 + (11)^2} = \sqrt{130}$

Page 178 , Example 3

(b) Find the midpoint between P and Q.

$\left(\frac{5}{2}, \frac{1}{2}\right)$

Page 180 , Example 6

(c) Find the slope of the line between P and Q.

$\frac{11}{3}$

Page 199 , Example 1

6. Find the center and radius of the circle given by the equation
$$x^2 + y^2 + 2x - 6y - 14 = 0 \rightarrow (x+1)^2 + (y-3)^2 = 24$$

Center $(-1, 3)$

radius : $\sqrt{24} = 2\sqrt{6}$

Page 194, Example 8

7. Give the equation of the line passing through the point $(-1, 3)$ and perpendicular to the line containing the points $(2, 3)$ and $(-1, 5)$.

$$y - 3 = \frac{3}{2}(x+1)$$

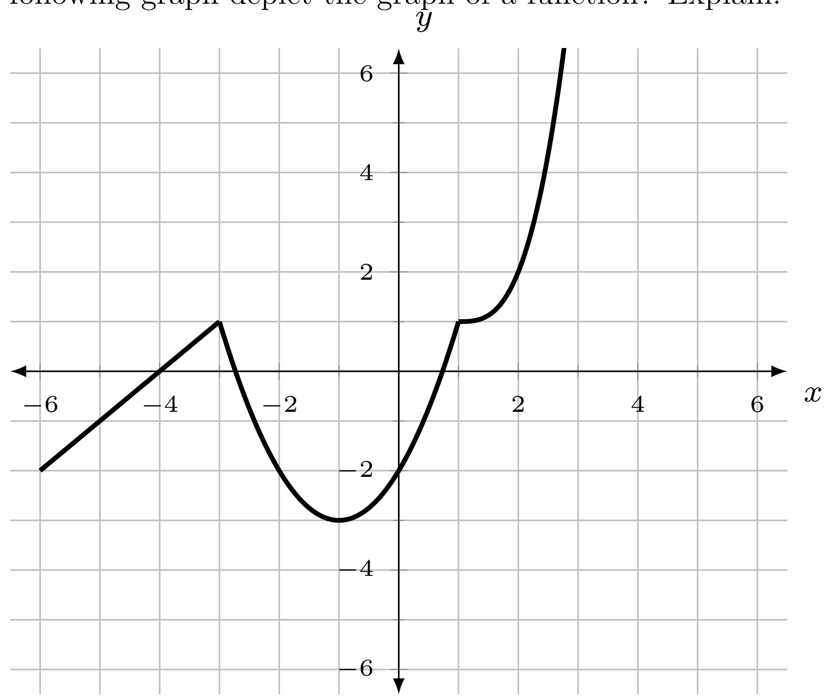
Page 206, Example 9
(Also see lecture notes on 2.3)

8. Find the domain of the function $g(x) = \dfrac{\sqrt{x+1}}{x-3}$.

$[-1, 3) \cup (3, \infty)$

Page 220 Example 5
(Also see lecture notes on 2.4)

9. Does the following graph depict the graph of a function? Explain.



Yes!

Vertical Line Test.

Page 222
Example 7

10. Determine algebraically whether the function f given by $f(x) = 3x^3 + 2x + 7$ is odd, even, or neither. Do the same for the function g given by $g(x) = \dfrac{x^4 - x^2}{x^6}$.

$g(x)$ is even

$g(-x) = g(x)$

$f(x)$ is neither

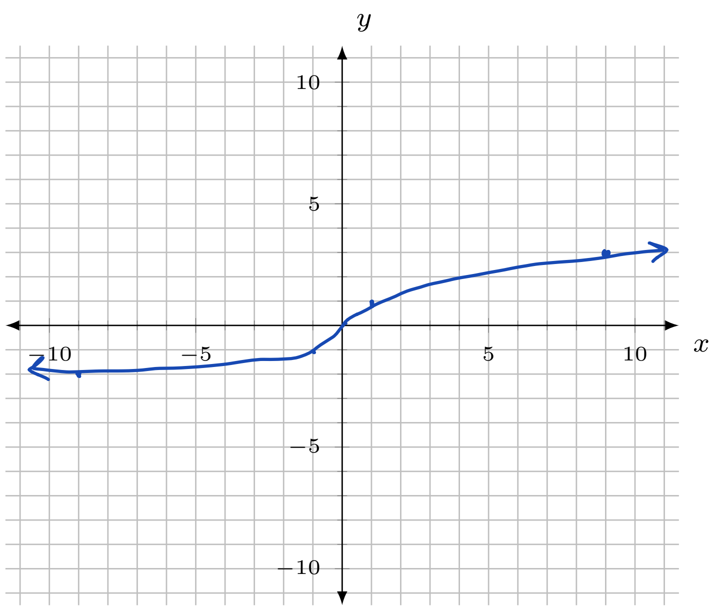
$$g(-x) = \frac{(-x)^4 - (-x)^2}{(-x)^6}$$

$$= \frac{x^4 - x^2}{x^6}$$

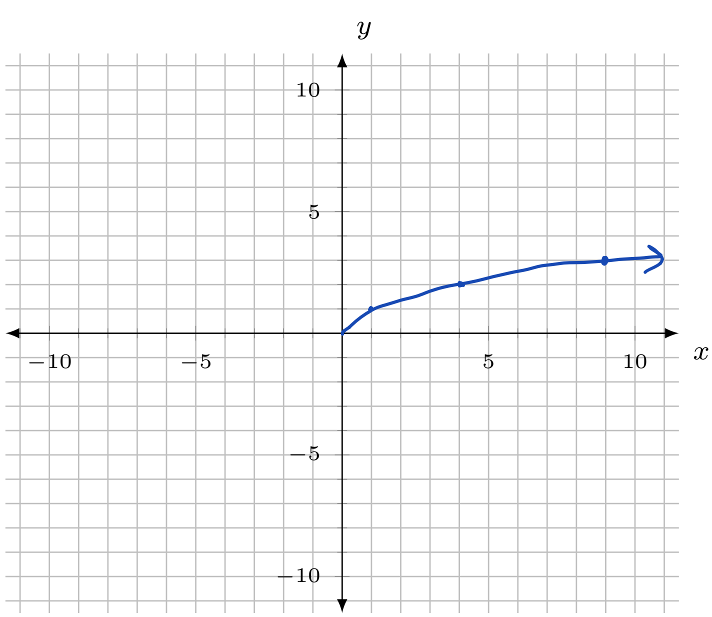
Page 241,
Example 7

11. Draw the graphs of the following functions without using and xy-table. Also determine geometrically if the functions are even, odd, or neither.

(a) $f(x) = \sqrt[3]{x}$

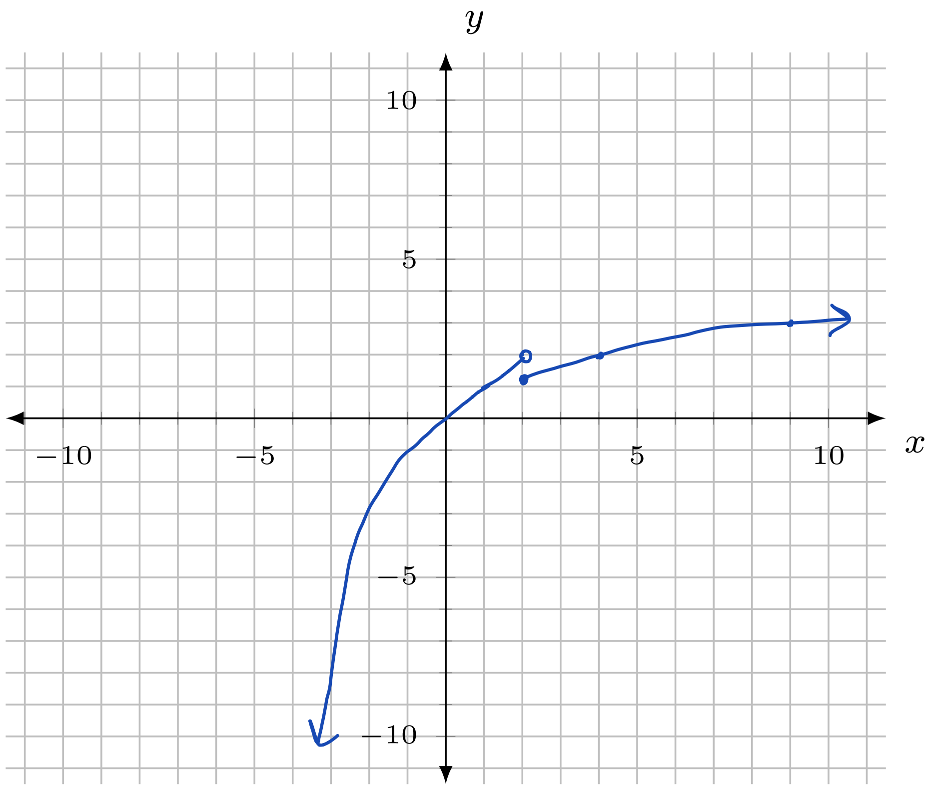


(b) $g(x) = \sqrt{x}$



Pages 257 -258

12. Graph the piecewise function: $f(x) = \begin{cases} x^3 & \text{if } x < 2 \\ \sqrt{x} & \text{if } x \geq 2 \end{cases}$.



Pg 255 Ex 8

13. The function f given by the rule $f(x) = \sqrt{2x+2} - 1$ is a transformation of a "standard function". Indicate what this standard function is, and the transformations needed to obtain $f(x)$.

Pages 257-258

Transformation worksheet

use the worksheet to "work backwards"

Standard function: $\sqrt{x}$

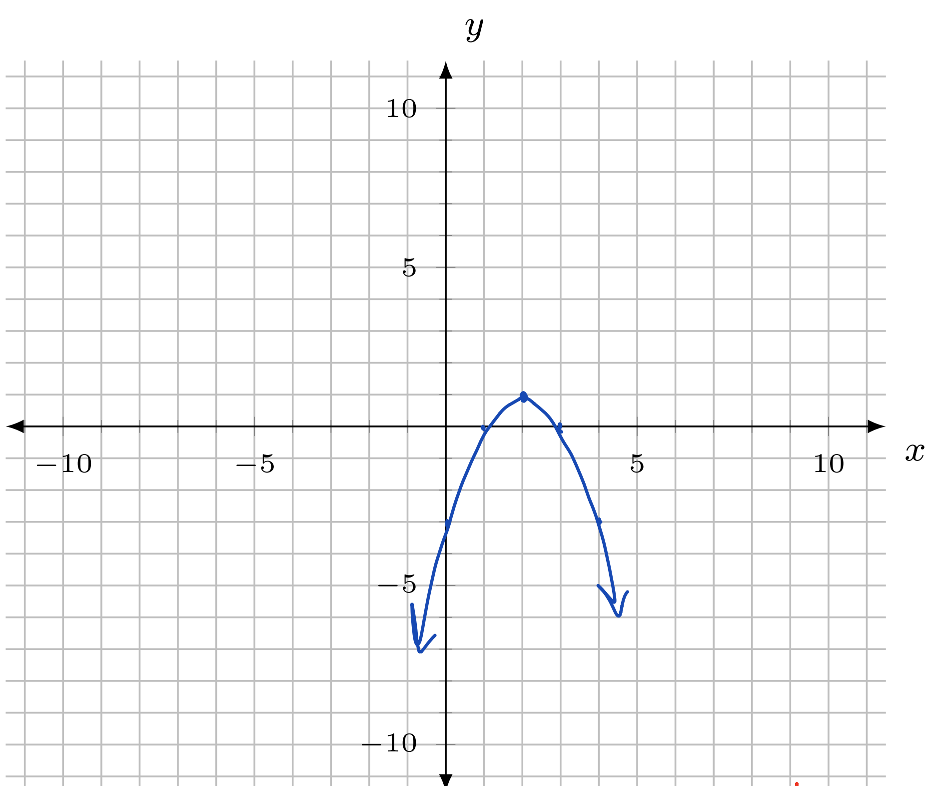
Transformations: down 1, compress horizontally by 2, and left 2

14. Write an equation for a function whose graph fits the given description: The graph of $g(x) = |x|$ is shifted right 2 units, reflected across the y-axis, and compressed horizontally by a factor of 5.

Transformation worksheet

$y = |-5x - 2|$

15. Graph the function obtained by shifting the graph of $f(x) = x^2$ by 2 units to the right, reflected across the x-axis, and shifted up 1 unit.



Transformation worksheet
& pgs 257-258

16. Let $f(x) = \dfrac{x+1}{x-1}$ and let $g(x) = \dfrac{1}{x}$. Find the composite function $(g \circ f)(x)$ and determine the domain of $(g \circ f)(x)$.

Pg 285, Examples 3 & 4

Pgs 286-287, Examples 6 & 7

$$(g \circ f)(x) = \frac{1}{\frac{x+1}{x-1}}$$

$$= \frac{x-1}{x+1}$$

Domain: (domain of $f(x)$) $\cap$ (domain of $\frac{x-1}{x+1}$)

$$= (-\infty, -1) \cup (-1, 1) \cup (1, \infty)$$

17. The function $h(x) = \sqrt{x+1} - 5$ is a composition of functions. Determine the two functions f, g such that $h(x) = (f \circ g)(x)$

$g(x) = x + 1$

$f(x) = \sqrt{x} - 5$

Page 288 Example 8