

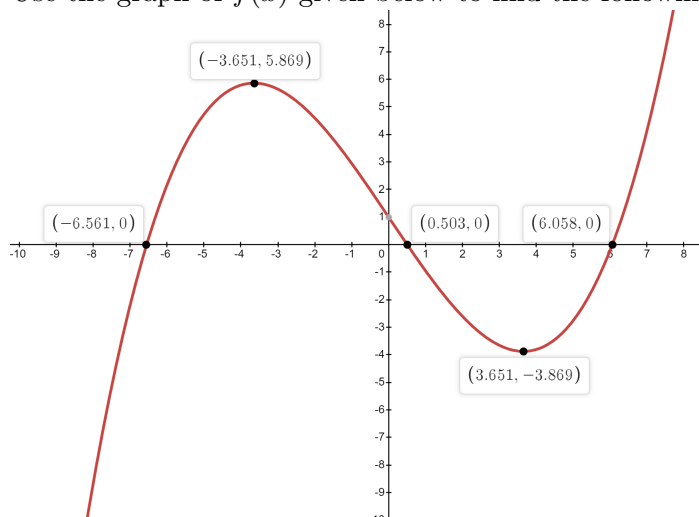
MATH 111

Exam 3 Review

The following are review exercises for the Math 111 third exam. These exercises are provided for you to practice or test yourself for readiness for the third exam. While preparing for the exam, students should not only rely on this review material. To best prepare, students may want to review also their recitation quizzes and applicable parts of Chapter 1 and 2 review exercises from the textbook. Show all your work: unsupported results may not receive credit.

1. Find the equation of a straight line that satisfies the given conditions. Express your answer in slope-intercept form.
 - (a) Passing through the point $(-3, 5)$ and parallel to the line $4x - 6y = 12$.
 - (b) Passing through the point $(4, 6)$ and with undefined slope.
 - (c) Perpendicular bisector of the line segment joining the points $(1, 1)$ and $(-1, 5)$.
 - (d) Passing through $(1, -2)$ and having the same x -intercept as the line $2x + 5y + 8 = 0$.

2. Use the graph of $f(x)$ given below to find the following.



- (a) Find the zeros of $f(x)$. Round your answer to the nearest tenth.
- (b) Find the local maximum and local minimum of the function.
- (c) Solve $f(x) > 0$. Express your answer using interval notation. Round your answer to the nearest tenth.

3. Given $f(x) = \sqrt{3x+1}$ and $g(x) = 2x$. Find the value(s) of x over the interval $[0, 5]$ where $f(x) = g(x)$.

4. Find the domain of the following functions. Express your answer using interval notation.

(a) $f(x) = \frac{4x^2 - 3x + 2}{3}$ (b) $g(x) = \sqrt{2x^2 - 5x - 3}$ (c) $h(x) = \sqrt[3]{3-x}$

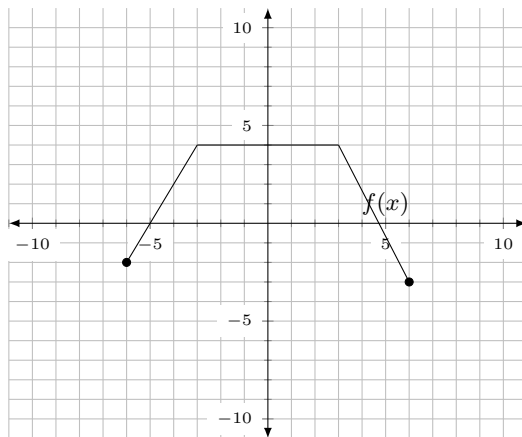
5. Given $f(x) = \begin{cases} 1 - x^2 & \text{if } -3 < x \leq 2 \\ 2x - 1 & \text{if } x > 2 \end{cases}$

- (a) Sketch the graph of $f(x)$. (b) Find $f(2)$ (c) Find the domain of $f(x)$.
 (d) Find the range of $f(x)$. (e) Find the interval where $f(x)$ is increasing.

6. Sketch the graph of the functions given below and find the exact values of the x intercept(s) and y -intercept(s) if they exist. Also find the domain and range.

(a) $f(x) = -|x+2| + 3$ (b) $g(x) = 2(x-1)^2 - 3$

7. Given the graph of $f(x)$.



(a) Sketch the graph of $g(x) = f(3x) - 2$ on the same set of axes.

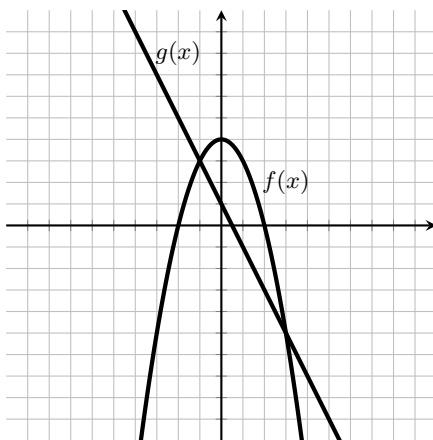
(b) Find $g(2)$.

8. Find and simplify $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$.

(a) $f(x) = -x^2 + 2x - 5$ (b) $f(x) = \frac{3}{x-4}$

9. Given $g(x) = \sqrt[3]{2x-3}$, find the exact value of $g^{-1}(2)$

10. The graph of $f(x)$ and $g(x)$ is shown below.



- (a) Find $(f - g)(1)$ (b) Find $g(f(-2))$ (c) Solve $f(x) = g(x)$
 (d) Find the interval where $f(x) < g(x)$

11. Given $f(x) = |x - 4|$ and $g(x)$ defined by the table below. Determine each of the following **exactly** expressing your answer in simplest form.

x	$g(x)$
-3	3
-1	0
0	2
1	5
3	6

- (a) $f(-1)$ (b) $(g \circ f)(1)$ (c) $(f \circ g^{-1})(3)$ (d) $(f \circ f)(0)$
 (e) $(f/g)(-1)$ (f) $(f \cdot g)(0)$

12. Given $f(x) = \frac{x}{\sqrt{x+3}}$. Find the following.

- (a) $f(x^2)$ (b) $[f(x)]^2$ (Simplify)

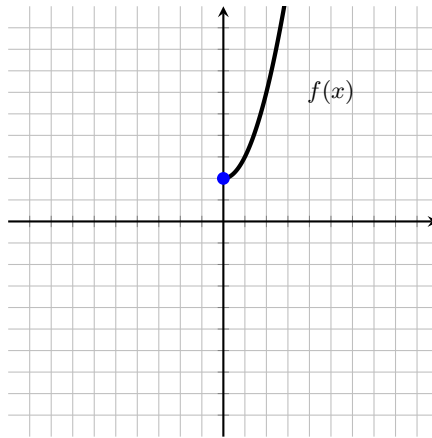
13. Given $f(x) = \sqrt{3x+2}$ and $g(x) = \frac{1}{x^2}$, find the following. Express your answer using interval notation where appropriate.

- (a) $(f \circ g)(x)$ (b) $(g \circ f)(x)$ (c) Domain of $(g \circ f)(x)$ (a) Domain of $(f+g)(x)$

14. Find the inverse for the following functions.

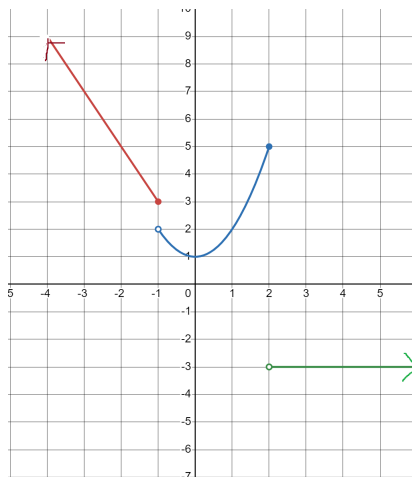
- (a) $f(x) = x^2 - 3, \quad x \geq 0$ (b) $h(x) = \frac{3x+2}{2x-5}$

15. The graph of $f(x)$ is shown below. Sketch the graph of $f^{-1}(x)$ on the same set of axes.



16. Six years ago a house was purchased for \$ 179,000. This year it was appraised at \$ 215,000. Assume that the value V of the house after its purchase is a linear function of time t (in years). Express V as a function of t . How many years after the purchase date was the house worth \$ 197,000?

17. Given the graph of a piecewise function $f(x)$. Find the following.



(a) Find the domain of $f(x)$.

(b) Find explicit formula for each piece of the function $f(x)$ of the form

$$f(x) = \begin{cases} \underline{\hspace{2cm}} & \text{if } x \leq -1 \\ \underline{\hspace{2cm}} & \text{if } -1 < x \leq 2 \\ \underline{\hspace{2cm}} & \text{if } x > 2 \end{cases}$$

(c) Does $f^{-1}(x)$ exist over the given domain of $f(x)$? Justify your answer.

Exam III Review Answers

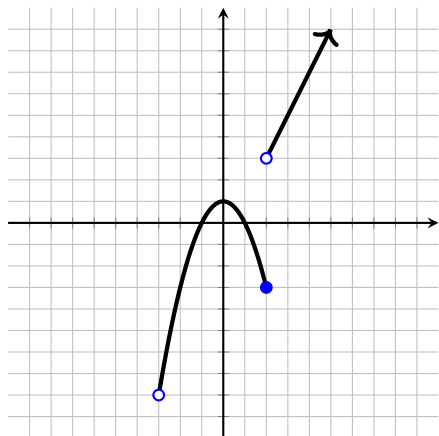
1a) $y = \frac{2}{3}x + 7$ (b) $x = 4$ (c) $y = \frac{1}{2}x + 3$ (d) $y = -\frac{2}{5}x - \frac{8}{5}$

2a) $-6.6, 0.5, 6.1$ 2b) Max. 5.869 Min. -3.869 2c) $(-6.6, 0.5) \cup (6.1, \infty)$

3) $x = 1$

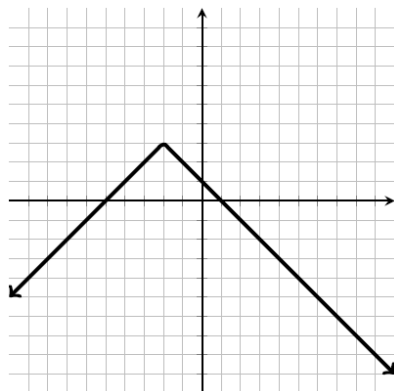
4a) $(-\infty, \infty)$ 4b) $(-\infty, -1/2] \cup [3, \infty)$ 4c) $(-\infty, \infty)$

5a)

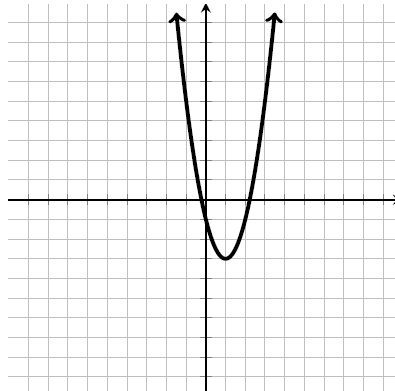


5b) -3 5c) $(-3, \infty)$ 5d) $(-8, 1] \cup (3, \infty)$ (5e) $(-3, 0), (2, \infty)$

(6a)

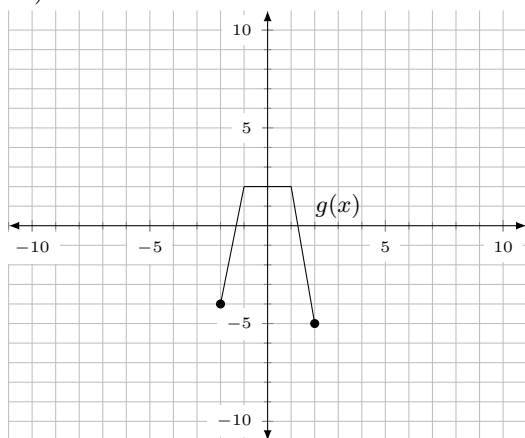


(6b)



	6a	6b
x -intercept	$-5, 1$	$1 \pm \frac{\sqrt{6}}{2}$
y - intercept	1	-1
Domain	$(-\infty, \infty)$	$(-\infty, \infty)$
Range	$(-\infty, 3]$	$[-3, \infty)$

7a)



7b) $g(2) = -5$

8a) $-2x - h + 2$ 8b) $\frac{-3}{(x-4)(x+h-4)}$

9) $\frac{11}{2}$

10a) 4 10b) 1 10c) $x = -1, 3$ 10d) $(-\infty, -1) \cup (3, \infty)$

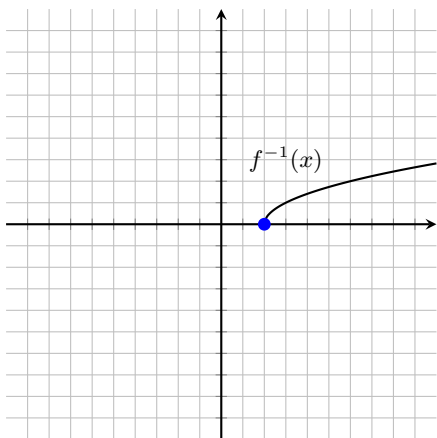
11a) 5 11b) 6 11c) 7 11d) 0 11e) Undefined 11f) 8

12a) $\frac{x^2}{\sqrt{x^2+3}}$ 12b) $\frac{x^2}{x+3}$

13a) $\sqrt{\frac{3}{x^2}+2}$ 13b) $\frac{1}{3x+2}$ 13c) $(-\frac{2}{3}, \infty)$ 13d) $[-\frac{2}{3}, 0) \cup (0, \infty)$

14a) $f^{-1}(x) = \sqrt{x+3}, x \geq -3$ 14b) $h^{-1}(x) = \frac{5x+2}{2x-3}$

15)



16a) $V(t) = 6000t + 179,000$ 16b) $t = 3$

17a) $(-\infty, \infty)$

17b) $f(x) = \begin{cases} -2x + 1 & \text{if } x \leq -1 \\ x^2 + 1 & \text{if } -1 < x \leq 2 \\ -3 & \text{if } x > 2 \end{cases}$

17c) No, since $f(x)$ is not one-to-one on its given domain.