

## Math 118 Exam 2 Practice Problems

Exam 2 will cover sections P.9 through 1.10 and will be on Tuesday, October 11.

My office hours: Mon 9:15 - 10:45, Wed 12:15 - 1:45, Thur 12:30 - 3:00, Fri 9:15 - 10:45 in Old Main 404

Drop in tutoring: 6-8 pm on Sunday, Monday, Tuesday, and Thursday in Zurn 213

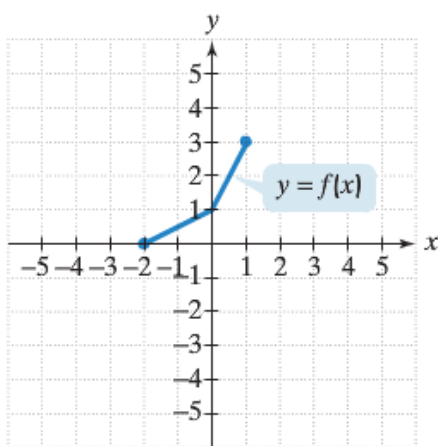
1. Solve the following inequalities. Express the solution set as an inequality or in interval notation.

(a)  $3(x + 4) \geq 5x - 12$

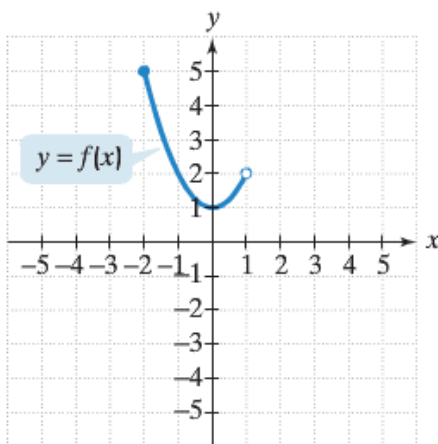
(b)  $\frac{x}{3} - \frac{3}{4} - 1 > \frac{x}{2}$

(c)  $4 + \left| \frac{2x + 6}{3} \right| \leq 6$

2. Find the domain and range of each function:



(a)



(b)

3. Sketch the graph of the following by applying transformations to the graph of  $y = x^2$ :

(a)  $y = (x - 2)^2$

(b)  $y = 3x^2 + 1$

(c)  $y = -(x - 3)^2 + 2$

(d)  $y = 2(x + 3)^2 - 1$

4. Find an equation, in any form, of the line

(a) through  $(2, 5)$  with slope 3

(b) through  $(1, 4)$  and  $(-1, 6)$

(c) with  $y$  intercept 3 and perpendicular to  $y = 5x + 6$

5. Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$  given

(a)  $f(x) = \sqrt{x}$ ,  $g(x) = 4x - 1$

(b)  $f(x) = \frac{1}{2+x}$ ,  $g(x) = 3x - 2$

(c)  $f(x) = \sqrt{x-2}$ ,  $g(x) = \sqrt{2-x}$

6. Find the inverse  $f(x)$ , and check your work.

(a)  $f(x) = 3x - 4$

(b)  $f(x) = \frac{5}{x} - 7$

7. Complete the square and write the equation in standard form. Then find the center and radius of each circle:

(a)  $x^2 + y^2 + 8x + 4y + 16 = 0$

(b)  $x^2 + y^2 + 12x - 6y - 4 = 0$

8. Find and simplify the difference quotient  $\frac{f(x+h)-f(x)}{h}$  for the following functions:

(a)  $f(x) = 4x + 1$

(b)  $f(x) = 2x^2 - x$

(c)  $f(x) = 3x^2 - \sqrt{7}$

9. A rectangular field is to be enclosed using 300 feet of fencing. A longer side of the field lies along a river, so only the two shorter sides and one longer side require a fence. Express the area,  $A$ , of the field as a function of the length of a shorter side,  $x$ .

10. A rectangular box has a square base. The length of the box is twice the length of one of the sides of the square base. Express the volume of the box,  $V$ , as a function of  $x$ , where  $x$  is one of the sides of the square base.

## Math 118 Exam 2 Practice Solutions

- $x \leq 12$ , or  $(-\infty, 12]$
  - $x < -\frac{21}{2}$ , or  $(-\infty, -\frac{21}{2})$
  - $-6 \leq x \leq 0$ , or  $[-6, 0]$
- Domain  $[-2, 1]$ , Range  $[0, 3]$
  - Domain  $[-2, 1]$ , Range  $[1, 5]$
- Omitted - ask in class if you're not sure!
- $y - 5 = 3(x - 2)$
  - $y = -x + 5$
  - $y = -\frac{1}{5}x + 3$
- $(f \circ g)(x) = \sqrt{4x - 1}$ ,  $(g \circ f)(x) = 4\sqrt{x} - 1$
  - $(f \circ g)(x) = \frac{1}{3x}$ ,  $(g \circ f)(x) = \frac{3}{2 + x} - 2$
  - $(f \circ g)(x) = \sqrt{\sqrt{2 - x} - 2}$ ,  $(g \circ f)(x) = \sqrt{2 - \sqrt{x - 2}}$
- Note: The check is omitted here, but will be required on the exam!  
Make sure  $(f \circ f^{-1})(x) = (f^{-1} \circ f)(x) = x$ 
  - $f^{-1}(x) = \frac{x + 4}{3}$
  - $f^{-1}(x) = \frac{5}{x + 7}$
- $(x + 4)^2 + (y + 2)^2 = 4$ ,  $c = (-4, -2)$ ,  $r = 2$
  - $(x + 6)^2 + (y - 3)^2 = 49$ ,  $c = (-6, 3)$ ,  $r = 7$
- 4
  - $4x + 2h - 1$
  - $6x + 3h$
- $A(x) = 300x - 2x^2$
- $V(x) = 2x^3$