MATH 118: Practice Midterm 2

Name: _____

Directions:

* Show your thought process (commonly said as ”show your work”) when solving each problem for full credit.
* If you do not know how to solve a problem, try your best and/or explain in English what you would do.
* Good luck!

Problem	Score	Points
1		10
2		10
3		10
4		10
5		10
6		10
7		10
8		10
		80

1. Short answer questions:

   (a) Given the function

   $$F(x) = \sqrt{x^2 + 1}$$

   find two functions f, g where $f \circ g = F$. You are not allowed to choose $f(x) = x$ or $g(x) = x$.

   (b) True or False: Whenever you see a negative square root, such as $\sqrt{-5}$, you should immediately pull out the $-$ and write $i\sqrt{5}$.

   (c) True or False: if $x = 3$ is a zero of the polynomial $P(x)$, then $(x + 3)$ is a factor of $P(x)$.

   (d) True or False: If $f(x) = x^2$, then $f(x + h) = x^2 + h$. If not, what should it be instead?

2. Solve the following equations and inequalities:

   (a) $\sqrt{2x+1}+1=x$

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

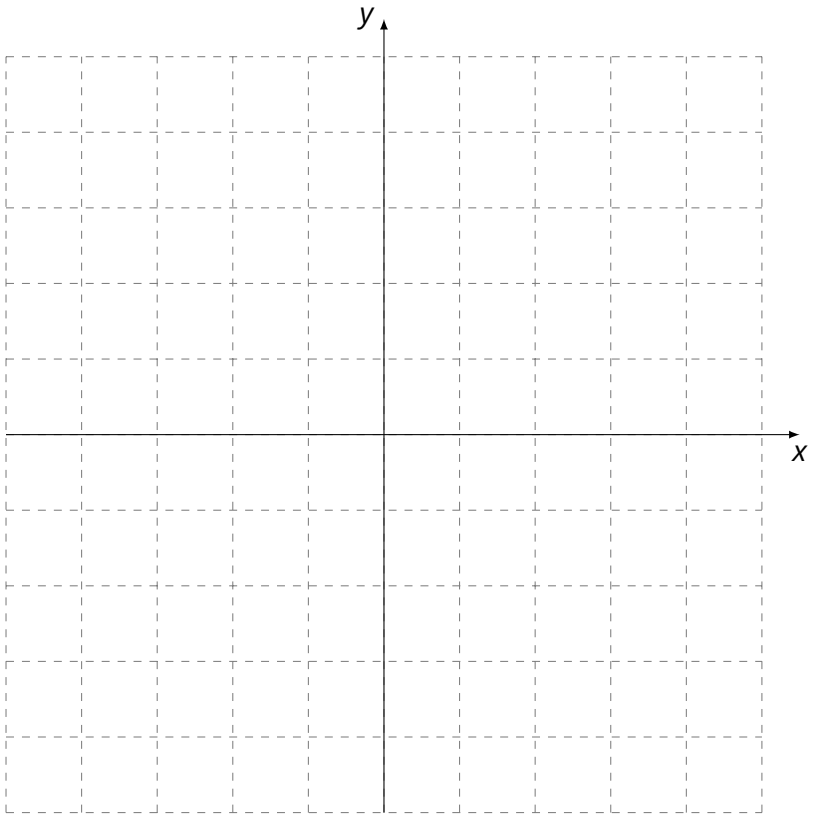
   (c) $1 \leq -2x+7 < 9$

(d) $\dfrac{\dfrac{4}{x^2} - 1}{x} = 0$

3. Perform the given instruction.

   (a) Suppose $g(x) = -|-2x + 4| + 3$. Write the order of transformations you would use to transform $f(x) = |x|$ into $g(x)$.

   (b) Now graph it and choose your tick marks:



4. Find the domain for each of the following functions:

   (a) $f(x) = x^8 - 2x^7 + 4x^2 - 2$

   (b) $h(x) = \sqrt{x} + \dfrac{1}{x}$

   (c) $f(x) = \dfrac{1}{x^2 - 3x + 2}$

5. Consider $f(x) = 1 - x$ and $g(x) = x^2 - x$. Expand **and simplify** the following:

   (a) $f(x) - 3g(x)$

   (b) $f(x)g(x)$

   (c) $f \circ g$

   (d) $g(x + h) - g(x)$

6. Perform the given instruction.

   (a) Draw a graph which satisfies the following:

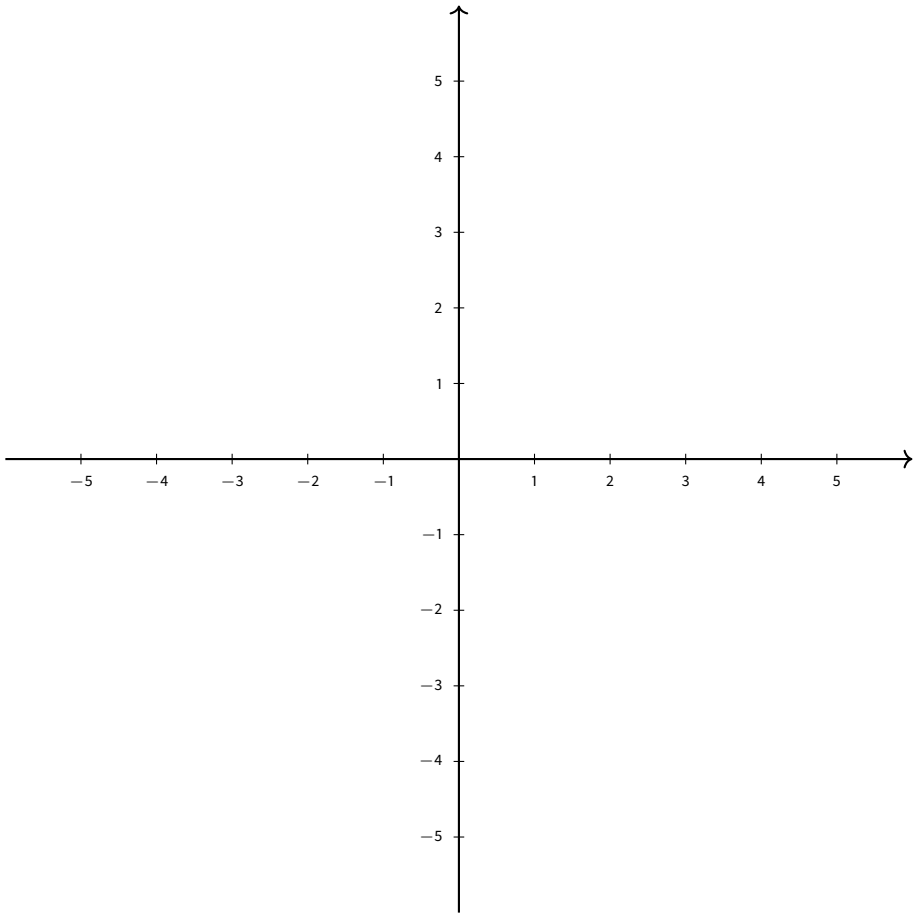
      i. Increasing on $(-\infty, -2) \cup (-1, 1) \cup (2, \infty)$

      ii. Decreasing on $(-2, -1) \cup (1, 2)$

      iii. Local maxima of $f(-2) = -2$

      iv. Local minima of $f(2) = 1$

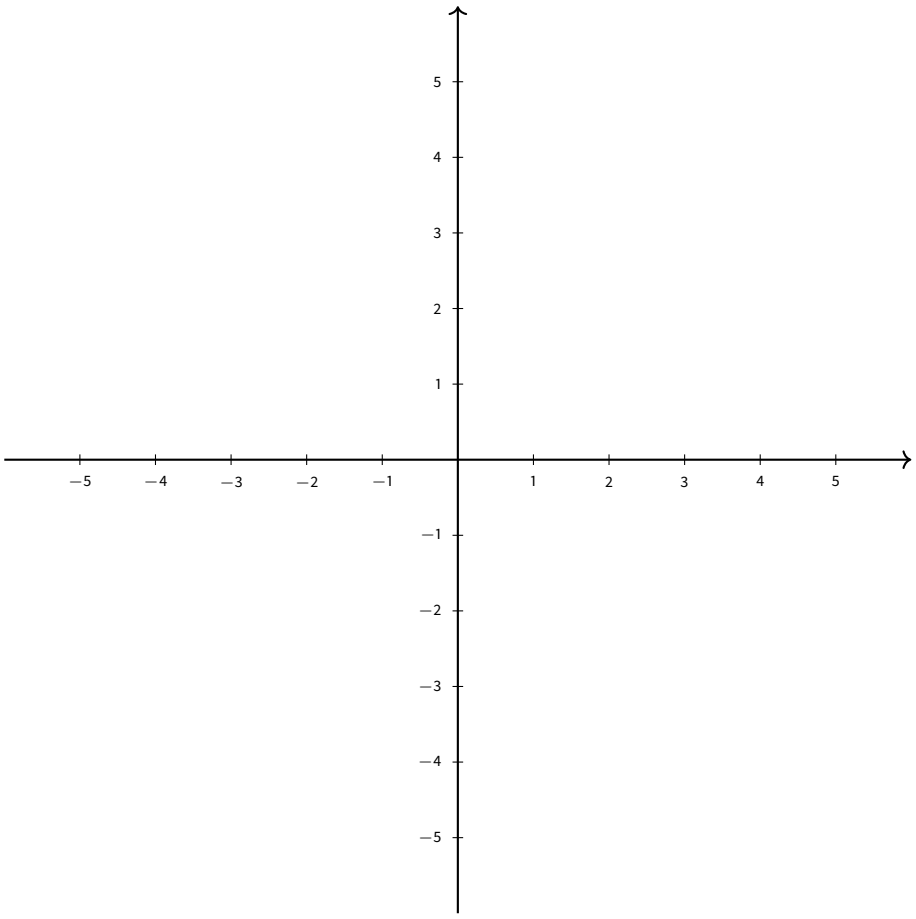
      v. $f(0) = 0$



(b) Put $f(x) = x^2 - 8x + 8$ into standard form. What is the vertex?

(c) Find the inverse of the function $f(x) = \dfrac{2x-3}{2x-5}$. You may use the fact that $f(x)$ is one-to-one.

7. Suppose $P(x) = x^5 - 3x^3$. Sketch a graph of $P(x)$ using the four step process.



8. Divide $P(x) = 4x^3 + 7x + 9$ by $D(x) = 2x + 1$. Write your answer in the form of the Division Algorithm.