MATH 1112 sections 54 Spring 2019

Sections Covered in Bittinger: 1.1, 9.1, 1.2, 2.2, 2.3, 2.1 (In Miller: 2.1, 9.1, 2.2, 2.3, 2.8, 2.7)

Calculator Policy: There will be NO calculator use on this exam. You are strongly encouraged to prepare for the exam without relying on a calculator.

This review is provided as a courtesy to give some idea of what material is covered. Nothing else is intended or implied.
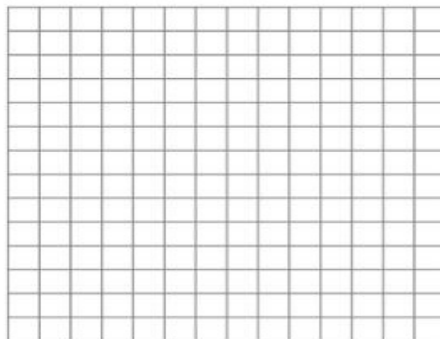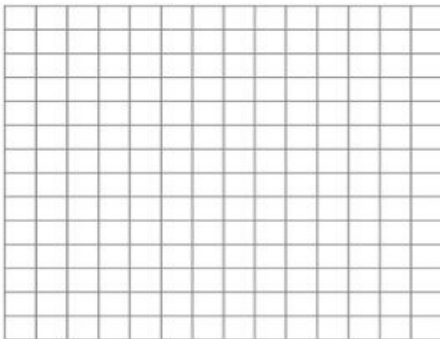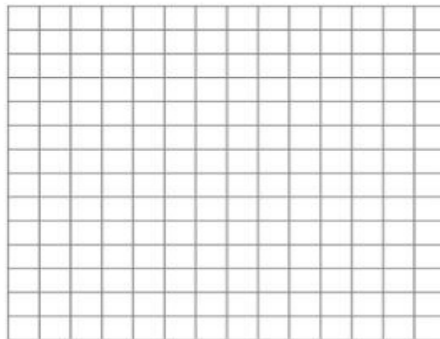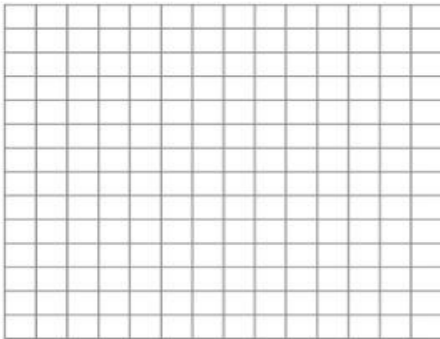
(1) How do you *complete the square*? Come up with your own example to illustrate the process.

(2) Each of the equations defines a circle in the plane. For each one, identify the center and the radius. Produce a plot on the graph paper provided.

1. $(x + 3)^2 + (y - 1)^2 = 4$

2. $x^2 + y^2 + 2y = 8$

3. $x^2 + y^2 - 2x - 4y + 4 = 0$

4. $x^2 + y^2 = 6y - 4x - 4$

(3) For each linear system of equations, determine if the system is consistent independent, consistent dependent, or inconsistent. If consistent, solve the system and give a description of the solution.

(a)
$$3x + 4y = 1$$
$$2x - y = 3$$

(b)
$$2x + 2y = 7$$
$$3x = 14 - 3y$$

(c)
$$-2x - 7y = 6$$
$$x - 3y = -2$$

(d)
$$3x - 2y = 5$$
$$4y = 6x - 10$$

(4) Aaron's boat travels 45 miles downstream in 3 hours. The return trip upstream takes 5 hours. Find the speed of the boat in still water, and the speed of the current. (Hint: Create a linear system in two variables. For example, let x be the speed of the boat in still water and y be the speed of the current. When traveling downstream, the speed is $x + y$, and traveling upstream it is $x - y$. Recall that distance = rate times time. Both trips are the same 45 mile distance.)

(5) Use the graph of $y = f(x)$ shown to answer the following questions.
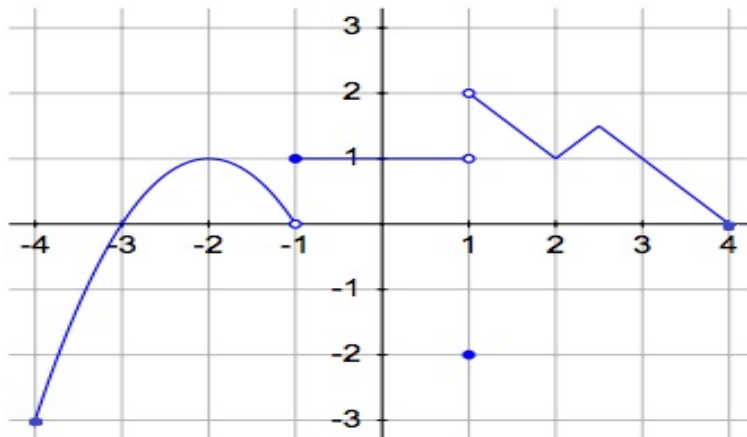
1. Evaluate $f(-1)$

2. On which intervals is f increasing?

3. Evaluate $f(1)$

4. Find all solutions of the equation $f(x) = 0$.

5. How many solutions are there to the equation $f(x) = \frac{1}{2}$?

6. Identify an interval over which f is constant.

7. Evaluate $f(f(-3))$. How about $f(f(f(-3)))$?

(6) Find the domain of each function. Express the answer using interval notation.

(a) $f(x) = \dfrac{1}{x^2 - 4}$

(b) $H(t) = \sqrt{1 - |t|}$

(c) $g(v) = \dfrac{1}{v^2 + 3}$

(7) Let $f(x) = 2x^2 - 3x$. Evaluate each of the following.

1. $f(2)$

2. $f(-2)$

3. $f(r)$

4. $f(4r)$

5. $f(x + h)$

6. $f(x + h) - f(x)$

7. $\dfrac{f(x + h) - f(x)}{h}$

(8) Consider the functions

$$f(x) = \sqrt{x^2 + 1}, \qquad g(x) = \frac{1}{x - 1}, \qquad \text{and} \qquad h(x) = 3x^2$$

Evaluate each expression. Simplify if possible.

1. $(f + g)(0)$

2. $\left(\dfrac{h}{f}\right)(1)$

3. $(hg)(2)$

4. $(f \circ g)(0)$

5. $(g \circ f)(0)$

6. $(h \circ f)(2)$

7. $(f \circ f)(1)$

8. $(f \circ g)(x)$

9. $(h \circ g)(x)$