

Print and sign a brief statement stating this is your work and you used no other resource:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
??	15	
??	10	
??	10	
??	15	
??	15	
??	15	
??	10	
??	10	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- Please turn off your mobile phone.
- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.

Common identities:

$$\cos(\alpha + \beta) = \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \quad \sin(\alpha + \beta) = \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).$$

(a)

1. Determine the value of x for each question below that satisfies the given equations.

$$\frac{4}{7}x - 1 = \frac{3}{5}x + 6$$

(b)

$$7x^2 + x = 4x^2 - x + 1$$

(c) $\sqrt{x+3} = x$

(a)

2. A line has a slope of 8.

The line goes through the point $(-5, 9)$. Determine a formula for the line.

Determine a formula for a different line that is perpendicular to the original line. The new line goes through the point $(2, 6)$.

(b)

3. The equation for a circle is given by

$$y^2 + 6y + x^2 - 8x = 11.$$

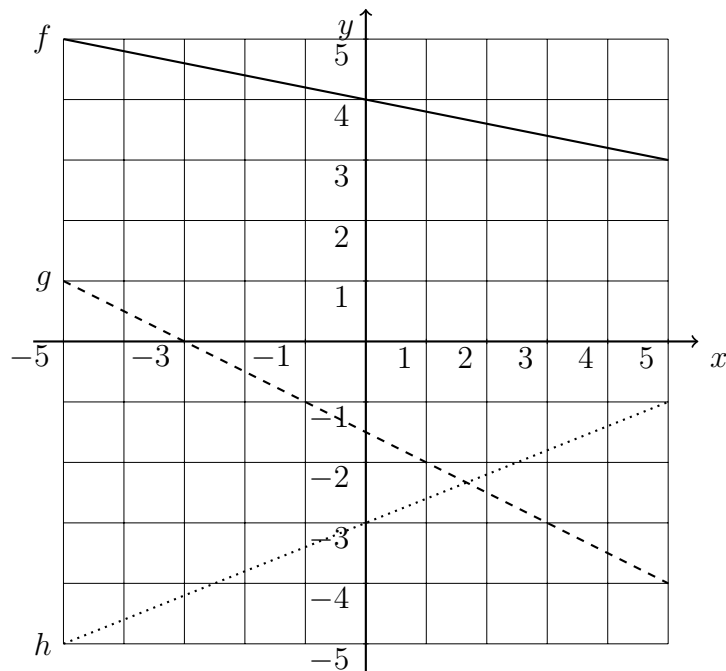
(a)

Determine the center and radius of the circle.

Determine the x -intercepts of the circle. (Determine the exact values.)

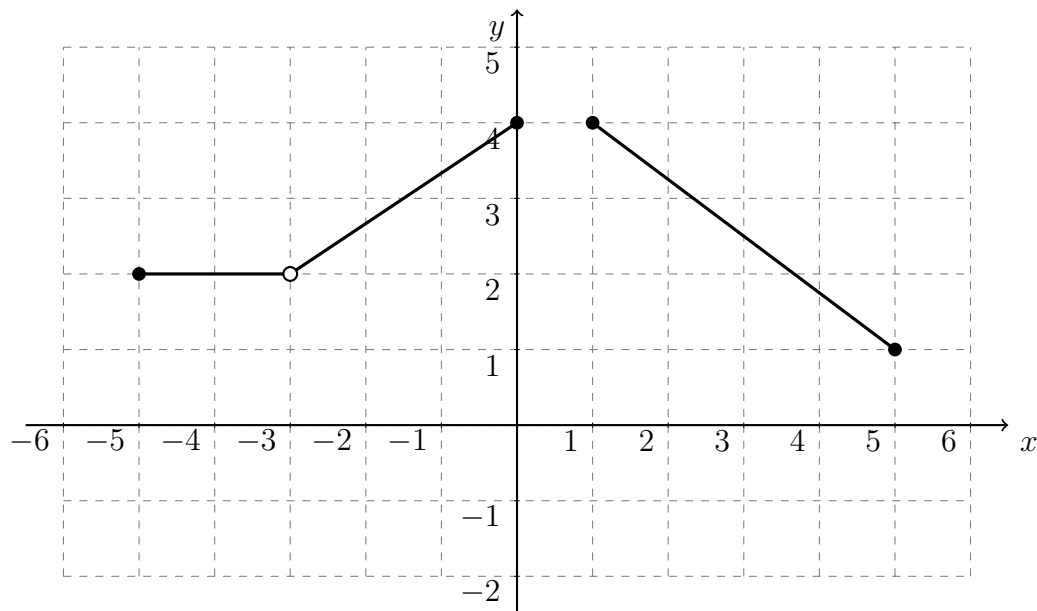
(b)

4. The questions below refer to the linear functions shown in the plot below. The function $f(x) = m_fx + b_f$ is shown with a solid line, the function $g(x) = m_gx + b_g$ is shown with a dashed line, and the function $h(x) = m_hx + b_h$ is shown with a dotted line.



- (a) Determine which y -intercept (b_f , b_g , and b_h) is the largest and which is the lowest. (Recall that a negative number is less than a positive number.) Provide a brief justification for your conclusion based on the graph.
- (b) Determine which slopes (m_f , m_g , and m_h) is the largest and which is the lowest. Provide a brief justification for your conclusion based on the graph.
- (c) Determine which function has the highest x -intercept and which function has the lowest x -intercept. Provide a brief justification for your conclusion based on the graph.

5. The graph of a function, q , is shown in the plot below.



(a)

Determine the domain of the function.

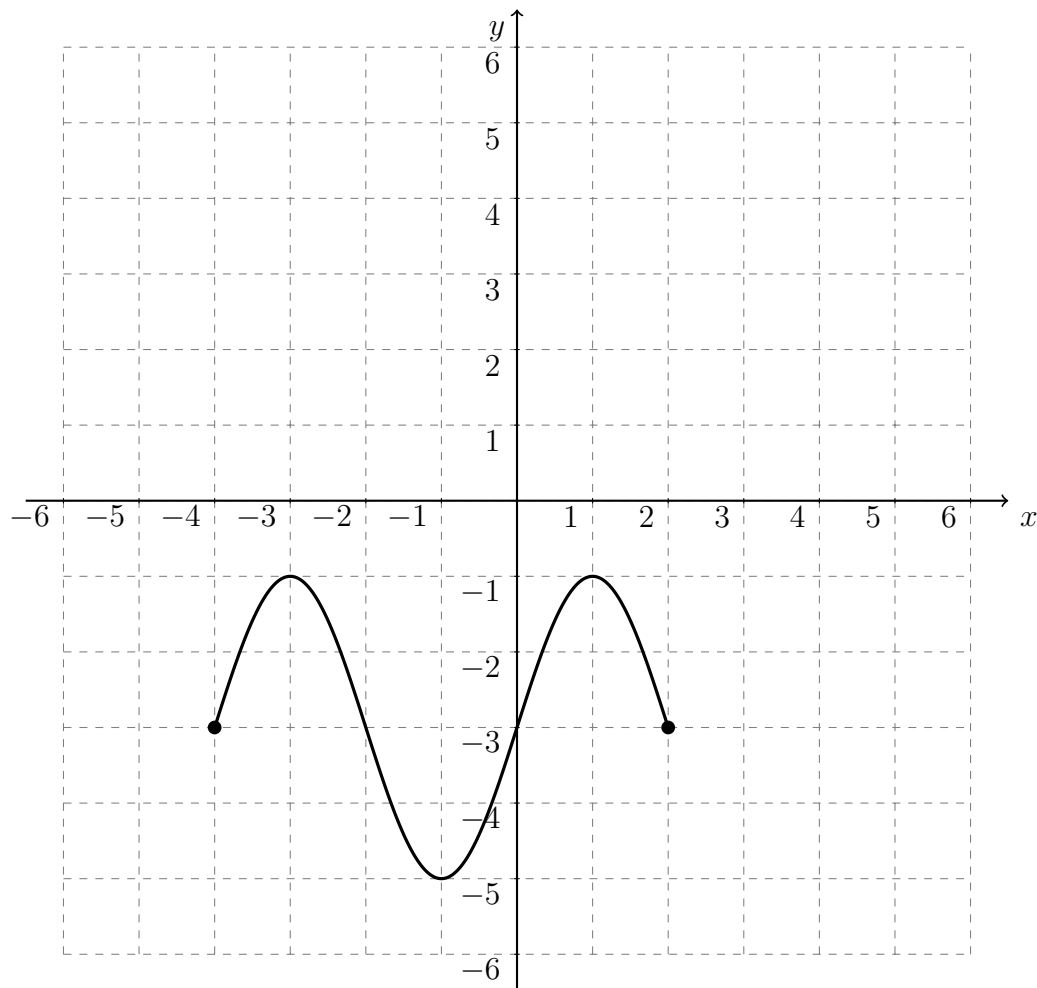
(b)

Determine the range of the function.

(c)

Express the formula for the function using the formal notation for a piecewise defined function.

6. The graph of a function, f , is given in the plot below.



- (a) Add a sketch of the graph of $g(x) = 2f(x - 1) + 8$ to the plot above.
- (b) Determine the values of x where the function $f(x)$ has a local maximum.
- (c) Determine the values of x where the function $h(x) = f(x + 4)$ is increasing.

7.

The Racine express is moving straight North out of Chicago, and the Davenport Traveler is moving straight West out of Chicago. At a given point in time the distance between the trains is four-hundred and fifty miles. If the Racine express is ninety miles North of Chicago determine the coordinates of the other train. (Treat Chicago as the origin.)

8.

A driver will drive a total distance of one hundred miles using two different cars. The driver will drive x miles in the first car and then y miles in the second car. The driver will go in a straight line without doubling back. The cost for driving the first car is x^2 , and the cost for driving the second car is $3 \cdot y^2$. Determine the values of x and y that will minimize the total cost.

Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____