

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	
??	15	
??	10	
??	5	
??	15	
??	20	
??	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:

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

1. Determine the values of x that satisfies each equation below. Print your answer in the box provided, and your answer should be an exact answer. (No decimal approximations.)

(a)

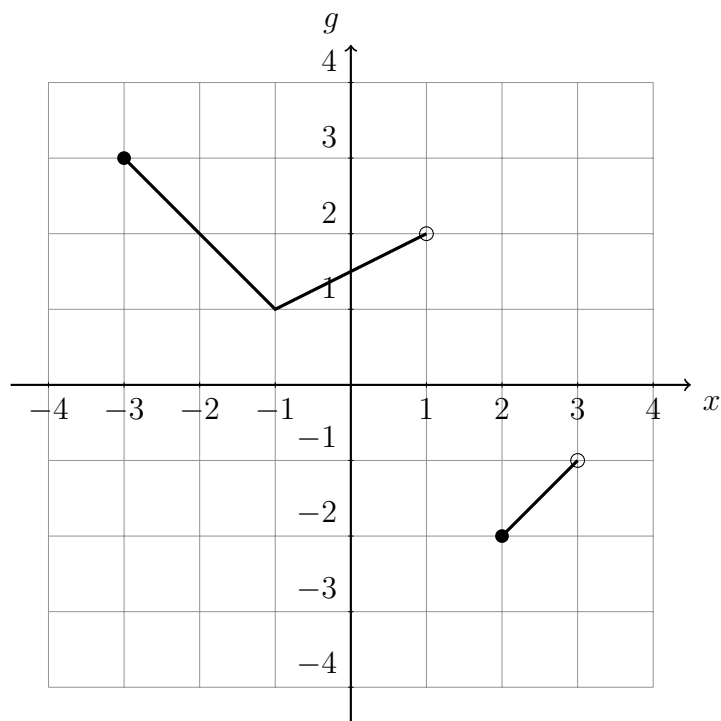
$$\frac{1}{x} - 1 = 2.$$

(b)

$$\sqrt{3x - 1} = 4.$$

(c) $\sqrt{8x+1} = x+1.$

2. The graph of a function, $g(x)$, is given in the plot below. Use the graph to answer the questions below.



(a)

Determine the domain of the function.

(b)

Determine the range of the function.

(c)

Determine a formula for the function. (Use proper notation.)

3. Two functions are defined,

$$\begin{aligned}f(x) &= x^2 - 1, \\g(x) &= \sqrt{2x + 1}.\end{aligned}$$

(a) Use the definitions to answer the questions below.

Determine the value of $f(g(4))$.

Determine the value of $g(f(4))$.

(b)

4. The function W is define to be

$$W(x) = \sqrt[3]{4 - x^2}.$$

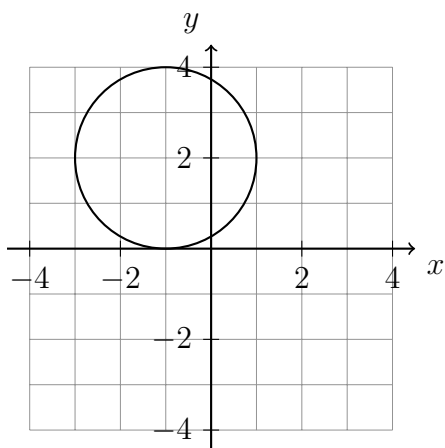
Determine two functions, u and v , so that

$$W(x) = u \circ v(x).$$

5. The energy costs for a building have a constant rate of increase of 80\$ per hour from 8:00am ($t = 0$ hours) to 6:00pm ($t = 10$ hours). From 6:00pm to midnight the energy costs increase at a constant rate of 45\$ per hour. The cost at 8:00am is estimated to be 300\$. Determine the energy costs for the building at any time between 8:00am and midnight.

6. For each relationship below determine if the relationship is a function. (Briefly explain your reasoning.) Also, determine the x and y intercepts of the relationships.

(a)

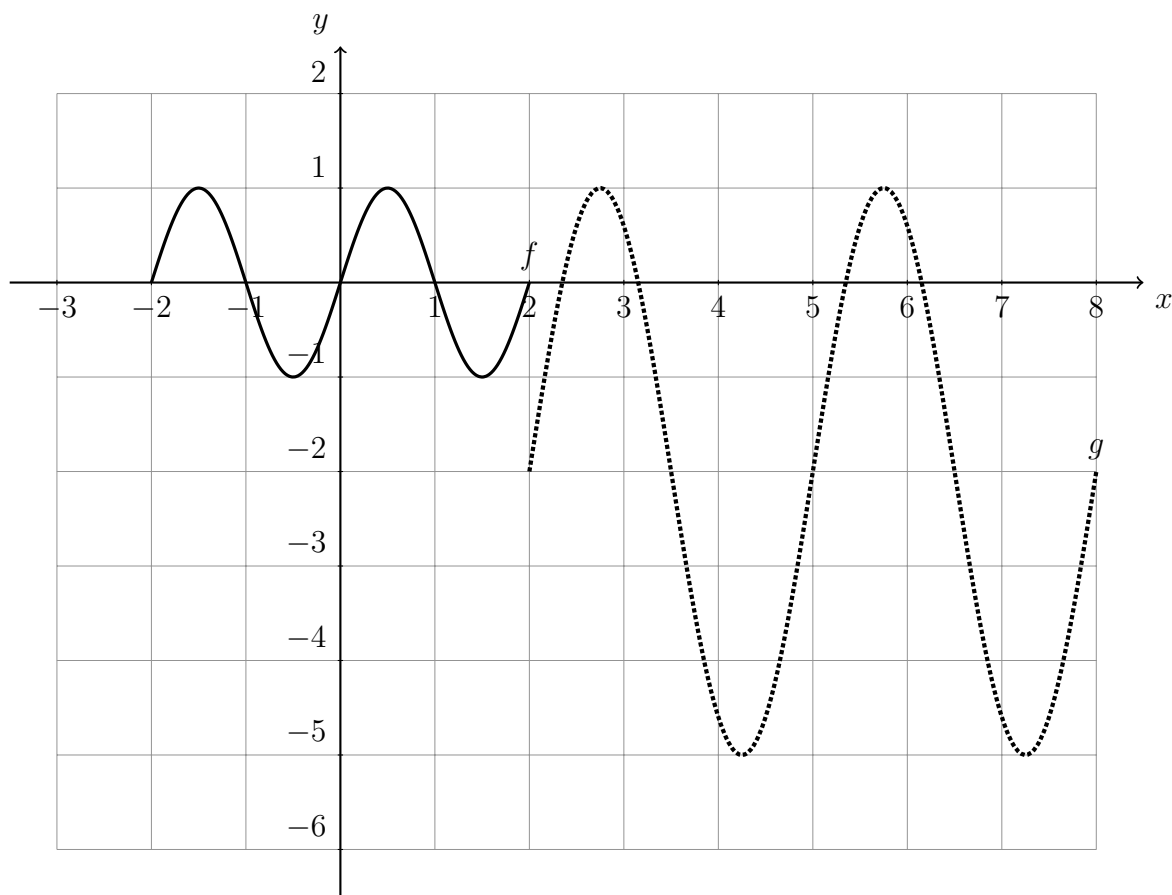


(b)

$$y = \sqrt{x + 2}.$$

7. The graph of a function, f , is shown in the figure below with a solid line. The function g is shown with a dotted line. Determine the values for all of the constants, A , b , c , and d so that

$$g(x) = A \cdot f(b \cdot x + c) + d.$$



$$A =$$

$$b =$$

$$c =$$

$$d =$$

8.

A process in a factory will make use of a large tank. For each gallon (x) the tank can hold, the plant will produce y items. The production costs of the factory will be 3,000\$ for each gallon the tank can hold plus 2,000\$ for each item. A total of 50,000\$ is allocated for the production costs. What values for x and y will maximize the total number of items produced?

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: _____