

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
??	0	
??	15	
??	10	
??	14	
??	15	
??	15	
??	17	
??	14	
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. Common Knowledge: How many orbits has Pluto completed since its discovery?

2. Determine all of the values of x for each question below that satisfy the given equation. If no values of x satisfy the equation provide a brief justification as to how you arrived at your conclusion.

(a)

$$\frac{x}{x+2} = 4.$$

(b)

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

(c)

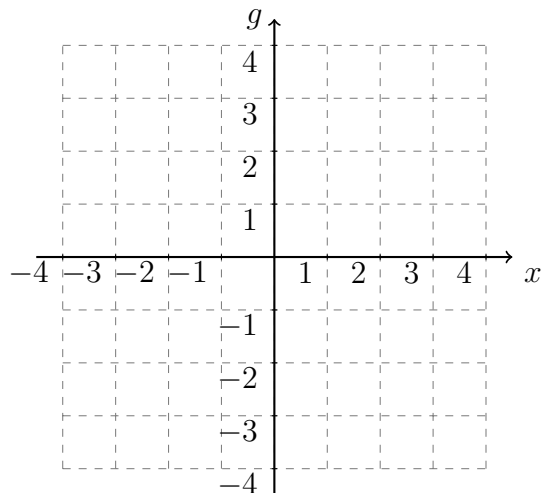
$$|x+3| = 7$$

3. The questions below refer to the function

$$g(x) = \begin{cases} x + 3 & -3 \leq x < -1, \\ -x^2 + 4x - 2 & 0 < x \leq 3. \end{cases}$$

(a)

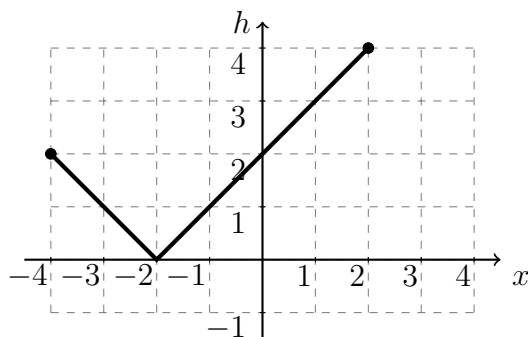
Make a rough sketch of the graph of the function, $g(x)$, using the axis below.



(b)

Determine the range and domain of the function, $g(x)$.

4. Two functions are given below. The graph of $h(x)$ is on the left, and the function $s(x)$ is defined on the right.



$$s(x) = x^2 - 4.$$

(a)

Determine the value of $s(h(-2))$.

(b)

Determine the value of $h(s(-2))$.

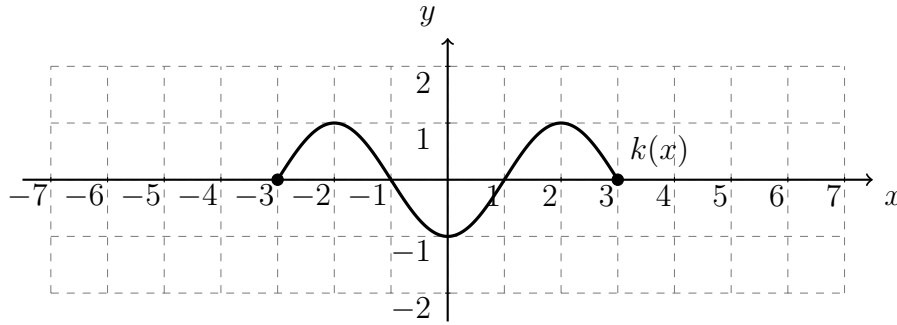
(c)

Determine the y -intercepts of $h(s(x))$.

(d)

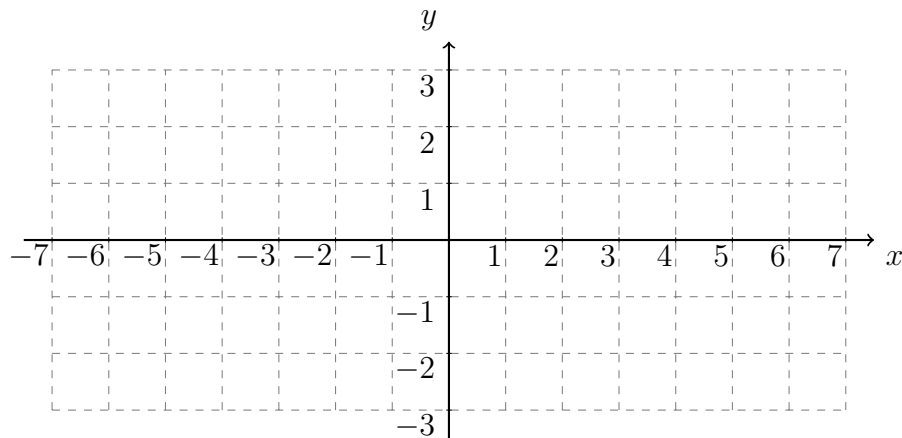
Determine the x -intercepts of $h(s(x))$.

5. The questions below refer to the following graph of a function, $k(x)$.



(a)

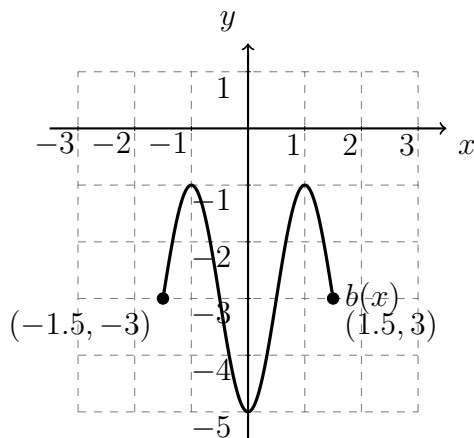
use the axes below to sketch a graph of the function $k(x - 3) + 1$.



(b)

The graph of the function $b(x)$ is given below. Determine the values of a , b , c , and d so that

$$b(x) = ak(bx + c) + d.$$



6.

The questions below refer to the function

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

_____ (a) Determine the average rate of change from $x = 1$ to $x = 3$.

(b) Determine a formula for the secant line through the points on the graph of the function $p(x)$ at $x = 1$ and $x = 3$.

(c) For what values of x is $p(x)$ increasing and what values is it decreasing? Also determine the values of x where a local minima or local maxima occur including a brief justification why the points are a minima or a maxima.

7. A company will rent temporary office space. The cost to rent a floor of a building is a fixed \$60,000 for the first four weeks. After the first four weeks the cost is an additional \$12,500 per week.

(a)

Determine the function that provides the total cost to rent the floor for a given number of weeks, t . Express your function using proper piecewise function notation.

A design group will pay \$98,000 to rent the floor. How long can they use the floor?

(b)

8.

Determine the two numbers that sum to fifteen whose product is as large as possible. (Justify your solution and do not state an intuitive guess.)

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: _____