

By providing my signature below I acknowledge that I abide by the University's academic honesty policy. This is my work, and I did not get any help from anyone else during the exam:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
1	0	
2	15	
3	10	
4	13	
5	12	
6	13	
7	15	
8	12	
9	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:

$$\begin{aligned}\cos(\alpha + \beta) &= \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \\ \sin(\alpha + \beta) &= \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).\end{aligned}$$

1. [2 Bonus] Common Knowledge: Who will win Lord Stanley's Cup in 2020?

2. Determine all of the values of x for each question below that satisfy the given equation.

(a) [5 pts] $3x - 1 = 8x + 1$

(b) [5 pts] $3x^2 + 7 = 13x$

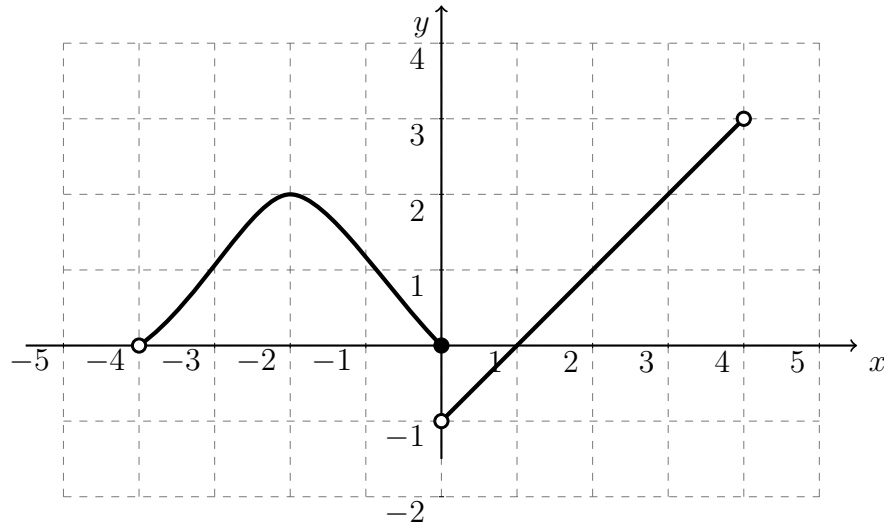
(c) [5 pts] $\sqrt{4x^2 - 1} = 7$

3. Determine the domain and range for each of the functions given below.

(a) [5 pts] $h(x) = \sqrt{x - 5}$

(b) [5 pts] $k(x) = \sqrt{x^2 - 5}$

4. The questions below refer to the function whose graph is shown below.



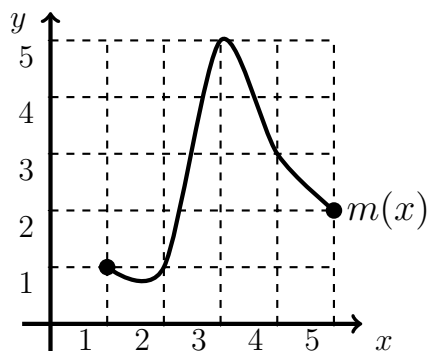
_____ (a) [5 pts] Determine the average rate of change of the function from $x = 0$ to $x = 2$.

(b) [5 pts] Determine the values of x where the function is increasing and also determine the values of x where the function is decreasing.

(c) [3 pts] Determine the points that represent local minimums or local maximums.

5. Two functions, h and m , are given below. Use the functions to answer each of the following questions. If a value does not exist briefly explain why.

x	$h(x)$
0	1
1	-2
2	-4
3	7
4	5



_____ (a) [4 pts] $h(m(4))$

_____ (b) [4 pts] $m(h(4))$

_____ (c) [4 pts] $h(m(3))$

6. The equations for two different quadratic functions are the following:

$$\text{Quadratic 1 : } y = -4(x - 2)^2 + 8,$$

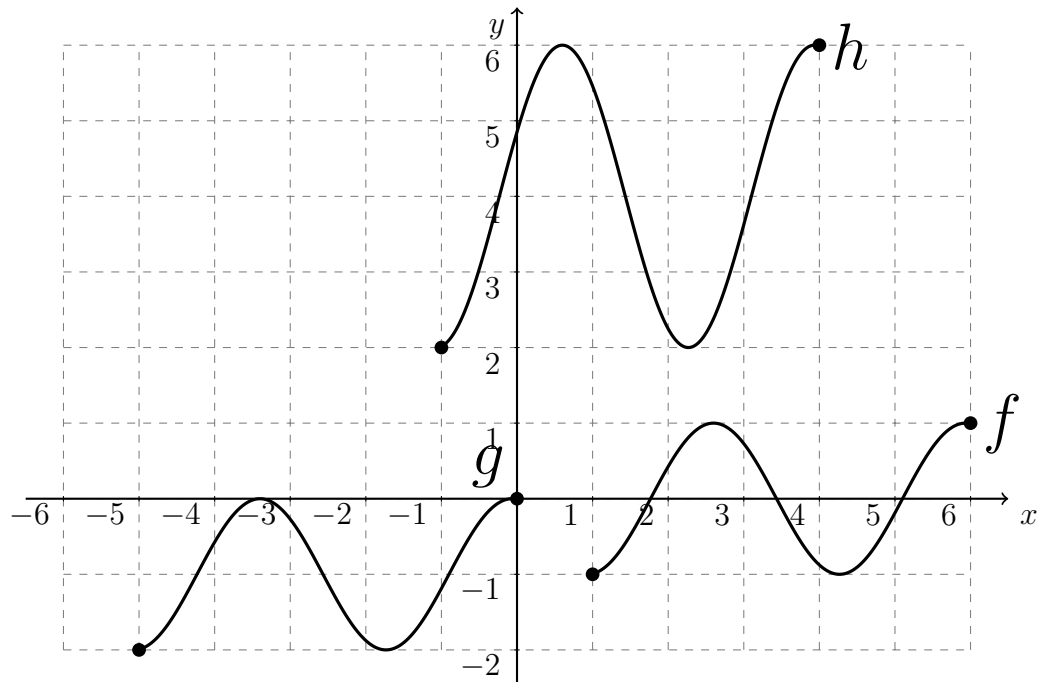
$$\text{Quadratic 2 : } y = a(x - 2)^2 + 4.$$

(a) [5 pts] Does the vertex for Quadratic 1 represent a local minimum or a local maximum? (Briefly explain your conclusion.)

(b) [5 pts] Determine the domain and range of Quadratic 1.

(c) [3 pts] What values of a will insure that there are points of intersection for the two quadratics. (Briefly explain your conclusion.)

7. The graphs of two functions, f and h , are given in the plot below.



_____ (a) [5 pts] Determine the domain and range of the function, f .

(b) [5 pts] The function g can be written in terms of f as $g(x) = Af(c \cdot x + d) + B$. Determine the values of A , B , c , and d .

(c) [5 pts] The function h can be written in terms of f as $h(x) = Af(c \cdot x + d) + B$. Determine the values of A , B , c , and d .

8. The viral load for a strain of flu, H5N1, changes over time. A subject is exposed to the virus, and initially the viral load for a subject is zero. Five days after exposure, the viral load is measured and is found to be 6 million copies per gram. The viral load varies linearly for the first seven days, and peaks at the end of seven days. After seven days the viral load begins to decrease at a constant rate of 0.5 million copies per day.

_____ (a) [6 pts] What is the maximum viral load for the subject?

(b) [6 pts] Express the viral load as a piecewise defined function.

9. [10 pts] A picture frame is to be constructed in the shape of a rectangle. The outside perimeter of the frame must be 9 meters. A gallery owner, Henri l'artiste impudique, does not like squares so he wants to maximize a function defined to be the area of the inside of the frame plus twice the height of the frame. What dimensions will should you use to meet Henri's request? (Ignore the width of the frame.)

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: _____