

**Math 151****Exam 1**

Show all work in a neat and organized fashion. Clearly indicate your answers. 100 points possible.

1. (10 pts.) Take home Maple problem.

2. (5 pts.) Solve the inequality in terms of intervals and illustrate the solution set on the real number line.

$$x^2 + 4x > 60$$

3. (5 pts.) Find the slope and  $y$ -intercept of the line and draw its graph.

$$y = -3$$

4. (5 pts.) Complete the square to show that the equation represents a circle and find the center and radius.

$$x^2 + y^2 - 6x + y = 0$$

5. (5 pts.) Identify the type of curve and neatly sketch the graph.

$$16y^2 - x^2 = 16$$

6. (10 pts.) Let

$$f(x) = \cos x, \quad g(x) = 5 - \sqrt{x}.$$

Find each of the following.

(a)  $f \circ g(x)$

(b)  $g \circ f(x)$

(c)  $f \circ f(x)$

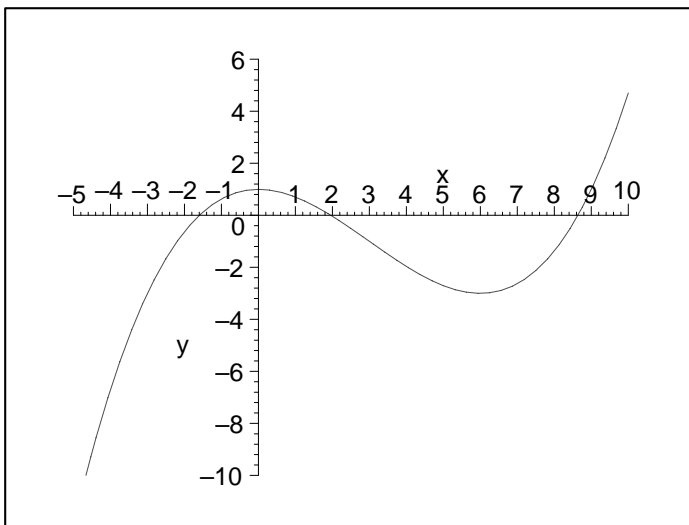
(d)  $g \circ g(x)$

7. (10 pts.) Evaluate the limit symbolically (algebraically), showing all significant algebraic steps.

$$\lim_{h \rightarrow 0} \frac{\frac{1}{5+h} - \frac{1}{5}}{h}$$

8. (5 pts.) For the function  $f$  whose graph is shown, arrange the following numbers in increasing order.

$$f'(-4) \quad f'(1) \quad f'(3) \quad f'(6) \quad f'(8)$$



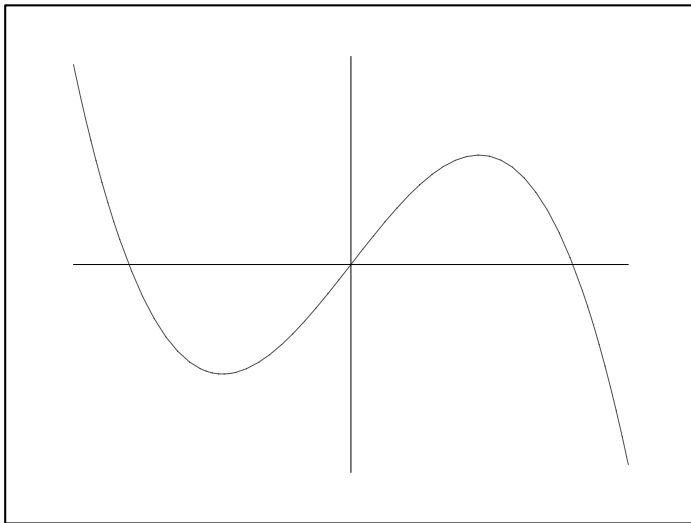
9. (5 pts.) Convert from radians to degrees.

$$-\frac{5\pi}{8}$$

10. (5 pts.) Find the remaining trigonometric ratios exactly. (Do not find decimal approximations.)

$$\cos \theta = -\frac{3}{8}, \quad \frac{\pi}{2} < \theta < \pi$$

11. (5 pts.) Consider the given function  $f$ . (Assume that the axes have equal scales.) Sketch the graph of  $f'$  below it.



12. Find the derivative of each function.

(a) (4 pts.)  $V(r) = \frac{4}{3}\pi r^3$

(b) (4 pts.)  $y = \sqrt{7x}$

(c) (4 pts.)  $y = \frac{\cos x}{x^4}$

(d) (4 pts.)  $g(\theta) = \theta^3 \tan \theta$

(e) (4 pts.)  $y = \sqrt{\sin x}$

(f) (4 pts.)  $y = (x^2 + 8x + 11)^5$

13. (6 pts.) Find an equation of the tangent line to the curve at the given point.

$$y = \frac{3x}{x+1}, \quad \left(1, \frac{3}{2}\right)$$