

Mth 201  
Hour Exam 2

Name: \_\_\_\_\_

Date: \_\_\_\_\_

9 Problems. 100 Points. Follow directions carefully. Please do not leave any question blank, and turn off cell phones and other noisemakers to avoid disturbing your classmates.

I have verified that this exam contains 9 problems and 6 printed pages.  
Initial\_\_\_\_\_.

Print the name of the people sitting either side of you :- \_\_\_\_\_

**Short Answer (7 points each) - Minimal explanation and calculations necessary though where appropriate, answers should be exact.**

1. Differentiate the function  $f(x) = \frac{e^{\pi e^2} - \pi e^\pi}{2e^{-\pi^2} + \sin(\pi/8)}$  with respect to  $x$ .

2. What is the slope of the tangent line to  $f(x) = x^2 - 3\pi x + 2$  at  $x = 0$ ?

3. Which rule, (product, chain or quotient) is required to differentiate the function  $g(x) = \sqrt{3x^2 - 2x + 1}$ ? Find its derivative.

4. Which rule, (product, chain or quotient) is required to differentiate the function  $g(x) = 3e^x \sin(x)$ ? Find its derivative.

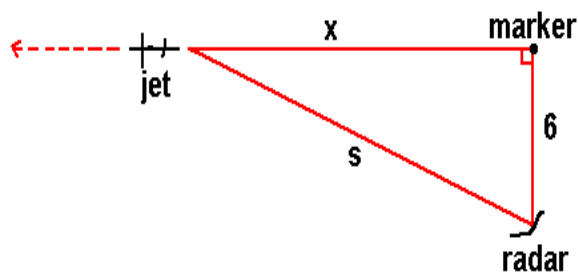
5. Which rule, (product, chain or quotient) is required to differentiate the function  $g(x) = \frac{2x^2}{e^x}$ ? Find its derivative.

6. Find the 211,385 th derivative of the function  $f(x) = e^x - e^{-x}$ .

**Long Answer (20 points each) - show work and provide explanations, an answer without supporting work will not receive credit.**

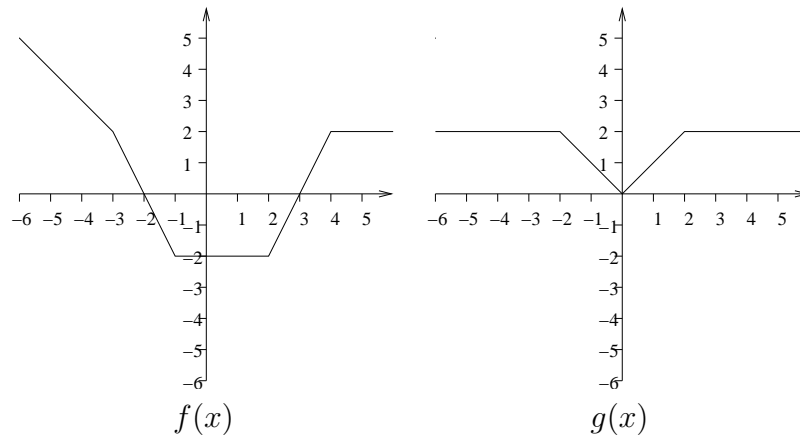
1. A low flying jet aircraft covering a straight course is tracked by a radar station set 6 miles to one side of the flight path (see figure below). The radar can only measure the distance  $s$  from the station to the aircraft and the rate of change  $\frac{ds}{dt}$  of the distance from the aircraft to the station. Use this information to determine the speed the aircraft ( $\frac{dx}{dt}$ ) when  $s = 10$  miles given that at this time  $\frac{ds}{dt} = 800$ mph.

**Top view - looking down**



2. Find the linear approximation to  $f(x) = x^{\sin(x)}$  at  $x = 1$ .

3. The graphs of  $f(x)$  and  $g(x)$  are given below.



(a) If  $F(x) = \frac{f(x)}{g(x)}$ , find  $F'(3)$ .

(b) If  $G(x) = f(x)g(x)$ , find  $G'(1)$ .

(c) If  $H(x) = f(g(x))$ , find  $H'(-1)$ .

(d) If  $K(x) = g(f(x))$ , find  $K'(3.5)$ .