U2 L6 Assignment

Complete each of the following questions showing all of your work. Work must be submitted to the assignment box (titled; U2 L6 Assignment).

Question One (7 marks)

Determine the derivative of the function $f(x) = \frac{5x^2(3-2x^2)}{(1+x)^3}$ simplify if possible

Question Two (7 marks)

Determine the derivative of the function $f(x) = (2x+4)^4(x^5+x-3)^3$ simplify if possible

Question Three (6 marks)

Write an expression for h'(x) given h(x)=p(x)q(x)r(x)s(x).

Question Four (6 marks)

If $f(x) = ax^3 + bx^2 + cx + d$ where a,b,c and d are constants. Determine a,b,c and d so that f'''(x) = 11.

Question Five (4 marks)

If f(3)=7 and f'(3)=-3, determine the exact value of g'(3) where $g(x) = 2x^2 \cdot f(x)$

Question Six (9 marks)

For which value(s) of x are the slopes of the tangents to $f(x) = \frac{x+3}{x-2}$ and $g(x) = \frac{x+2}{x-1}$ equal?

Question Seven (3 marks)

What does it mean if the derivative of a function is always negative? Give an example of such a function.

Question Eight (4 marks)

Steve takes the derivative of the function $f(x) = \frac{2(x^2+3)}{(1-x^3)}$ and obtains the answer $f'(x) = \frac{4x}{-3x^2}$. Explain what they did incorrectly. State the rule they should have followed.

Question Nine (11 marks)

A company's revenue for selling x items of a commodity, in thousands of dollars, is represented by the function $R(x) = \frac{15x-x^2}{x^2+15}$ .a) Determine the rate of change of revenue for the sale of 800 items and of 2400 items. b) Compare the values in part a) and explain their meaning. c) Determine the number of items that must be sold to determine a $0 rate of change in

revenue. d) Determine the revenue for the value found in part c) and explain its significance.

Question Ten (13 marks)

A store sells an average of 120 DVD's per week at $24 each. A market survey indicates that for each $0.75 decrease in price, 5 additional CD's will be sold per week. a) Determine the demand or price function b) Determine the marginal revenue from the weekly sales of 150 DVD's c) The cost of producing x DVD's is $C(x) = -0.003x^2 + 4.2x + 2500$, determine the marginal cost of producing 150 DVD's. d) Determine the marginal profit from the weekly sales of 150 DVD's.

Question Eleven (9 marks)

A water balloon is hot into the air. Its height, in metres, after t seconds is given by the function $h(t) = -4.9t^2 + 12t + 0.2$. a) Determine the height of the balloon after 2 seconds. b) Determine the rate of change of the height of the missile at 1 s and at 4 s. c) how long does it take for the balloon to return to the ground? d) How fast was the balloon travelling when it hit the ground? Explain your reasoning.