Mathematics 122

Quiz 16 Name: Key

You must show your work to get full credit.

1. Find the following derivatives:

(a) $w = (t^2+1)^{100}$

$\frac{dw}{dt} = 100(t^2+1)^{99}(2t)$

$\frac{dw}{dt} = 200t(t^2+1)^{99}$

(b) $f(t) = \ln(t^2+1)$

$f'(t) = \frac{1}{t^2+1}(t^2)' = \frac{2t}{t^2+1}$

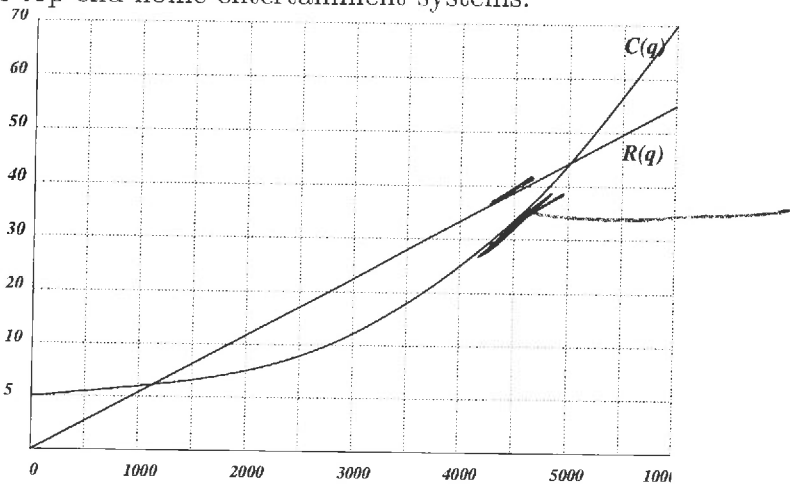
$f'(t) = \frac{2t}{t^2+1}$

(c) $f(x) = 6e^{5x} + e^{-x^2}$

$f'(x) = 5 \cdot 6e^{5x} + e^{-x^2}(-2x)$

$f'(x) = 30e^{5x} - 2xe^{-x^2}$

2. The following graph shows the revenue and cost for a in millions of dollars for a company to produce a quantity, q, of top end home entertainment systems.



slope of tangent line = MC(4,500) is longer than slope of the line

(a) When $q = 4{,}500$ which is larger the marginal cost $MC(4{,}500) = C'(4{,}500)$ or the marginal revenue $MR(4{,}500) = R'(4{,}500)$?

Which is larger MC(4,500)

(b) Write a sentence or two explaining how you figured this out.

Because the slope of C(q) at $q = 4500$ is longer than slope of R(q) at 4500

(c) If the company is producing 4,500 entertainment systems, should they increase or decrease production and why?

Decrease as cost of producing more systems is greater that revenue it brings in.