

# Quiz 7 Solutions

Tuesday, July 07, 2009  
4:21 PM

Math 175

Quiz 7

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

Show work for partial credit.

1.  $f(x) = \frac{x^4}{x} e^{2x}$ . Find  $f''(x)$  and simplify.

$$f'(x) = x^4 2e^{2x} + 4x^3 e^{2x} = (2x^4 + 4x^3)e^{2x}$$

$$f''(x) = (2x^4 + 4x^3) 2e^{2x} + (8x^3 + 12x^2)e^{2x}$$

$$f''(x) = (4x^4 + 16x^3 + 12x^2)e^{2x}$$

2. The resale value of  $R$  (in dollars) of a company car after  $t$  years is estimated to be  $R(t) = 20,000e^{-0.15t}$ . What is the rate of depreciation (in dollars per year) after 2 years?

$$R'(t) = 20,000 e^{-0.15t} (-0.15)$$

$$R'(2) = 20,000 e^{-0.15(2)} (-0.15) \text{ \$/year} = -\$4444.91 \text{ /year}$$

The car is losing value at a rate of \$4444.91 per year.

3. Where is the function  $f(x) = \ln(x^2 + 4)$  concave down? Justify your answer and express it as an interval.

$$f'(x) = \frac{1}{x^2+4} \cdot 2x = \frac{2x}{x^2+4}, \quad f''(x) = \frac{(x^2+4)(2) - 2x(2x)}{(x^2+4)^2}$$

$$= \frac{8-2x^2}{(x^2+4)^2} = \frac{2(2-x)(2+x)}{(x^2+4)^2}$$



CD on  $(-2, 2)$

4. Find  $y'$  and the slope of the tangent line to the graph of  $(y-3)^4 - x = y$  at the point  $(-3, 4)$ .

$$4(y-3)^3 y' - 1 = y'$$

$$4(y-3)^3 y' - y' = 1$$

$$(4(y-3)^3 - 1) y' = 1$$

$$y' = \frac{1}{4(y-3)^3 - 1}$$

at  $(-3, 4)$

$$m = y' = \frac{1}{4(4-3)^3 - 1} = \frac{1}{3}$$