MATH 113 – QUIZ 8 – 26 MARCH 2007

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. Consider the function $f(x) = 2x^3 + 4x^2 - 3x + 1$.

(a) (3 pts.) Find the linearization of $f(x)$ at $a = -1$.

$f'(x) = 6x^2 + 8x - 3$

$f'(-1) = 6 - 8 - 3 = -5$

$f(-1) = -2 + 4 + 3 + 1 = 6$

$L(x) = f(-1) + f'(-1)(x+1) = 6 - 5(x+1) = -5x + 1$ //

(b) (3 pts.) Find the differential df for $f(x)$.

$df = f'(x)\,dx = (6x^2 + 8x - 3)\,dx$ //

(c) (2 pts.) Use differentials to estimate the change $\Delta f = f(x_0 + dx) - f(x_0)$ when $x_0 = -1$ and $dx = 0.2$.

$\Delta f \approx df = f'(-1)(0.2) = -5(.2) = -1$ //

2. (3 pts.) The radius, r, of a circle is increased from 2.00 to 2.02 centimeters. Use differentials to estimate the change in area dA from this change in radius dr. (Hint: $A = \pi r^2$).

$A = \pi r^2$ $\qquad r = 2.00$

$dr = .02$

$dA = 2\pi r\,dr$

$\Delta A \approx dA = 2\pi(2)(.02) = .08\pi \approx .251$ //