Quiz 6 Calculus 1 Due 10/31/2012

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. a) Find the linear approximation $L(x)$ for $f(x) = \sqrt[3]{x}$ at 8.

$f(x) = x^{1/3}$ $\quad f(8) = \sqrt[3]{8} = 2$

$f'(x) = \frac{1}{3}x^{-2/3}$

$f'(8) = \frac{1}{3(8^{2/3})} = \frac{1}{12}$ $\quad \boxed{L(x) = \frac{1}{12}(x-8)+2}$

Wonderful!

b) Use your linearization from part a to approximate $\sqrt[3]{8.01}$.

$L(8.01) = \frac{1}{12}(8.01-8)+2$

$\boxed{L(8.01) = 2.00083}$

c) Use your linearization from part a to approximate $\sqrt[3]{8.1}$.

$L(8.1) = \frac{1}{12}(8.1-8)+2$

$\boxed{L(8.1) = 2.0083}$

d) Use your Linearization from part a to approximate $\sqrt[3]{27}$.

$L(27) = \frac{1}{12}(27-8)+2$

$\boxed{L(27) = 3.583}$

2. a) Find the linear approximation $L(x)$ for $f(x) = \arctan x$ at 0.

$f'(x) = \frac{1}{1+x^2}$ $\quad f(0) = \tan^{-1}(0) = 0$

$f'(0) = \frac{1}{1+0^2} = 1$ $\quad L(x) = 1(x-0)+0$

$\boxed{L(x) = x}$

Excellent!

b) Use your Linearization from part a to approximate arctan 0.1.

$\boxed{L(0.1) = 0.1}$