

MAT 106
Quiz #8
22 September 2004

Name: _____

You may not use your notes. Please show all of your work. An answer without justification will receive little credit.

- (1) Approximate $\sqrt{10}$ using the technique of linear approximation.

We take $f(x) = \sqrt{x}$. Then $f'(x) = \frac{1}{2\sqrt{x}}$. We will linearize f at 9. We note that $f(9) = 3$ and $f'(9) = \frac{1}{6}$. Thus the linearization of f at 9 is given by

$$\begin{aligned} L(x) &= f(9) + f'(9)(x - 9) \\ &= 3 + \frac{1}{6}(x - 9). \end{aligned}$$

So we have

$$\sqrt{10} = f(10) \approx L(10) = 3 + \frac{1}{6}(10 - 9) = \frac{19}{6} \approx 3.166666667.$$

(My calculator estimates $\sqrt{10}$ to be about 3.162277660. Thus our approximation is quite close.)