

STUDENT NAME:

Calculus 1550, section 6. Thursday, April 15, 2004. Seventeenth quiz.

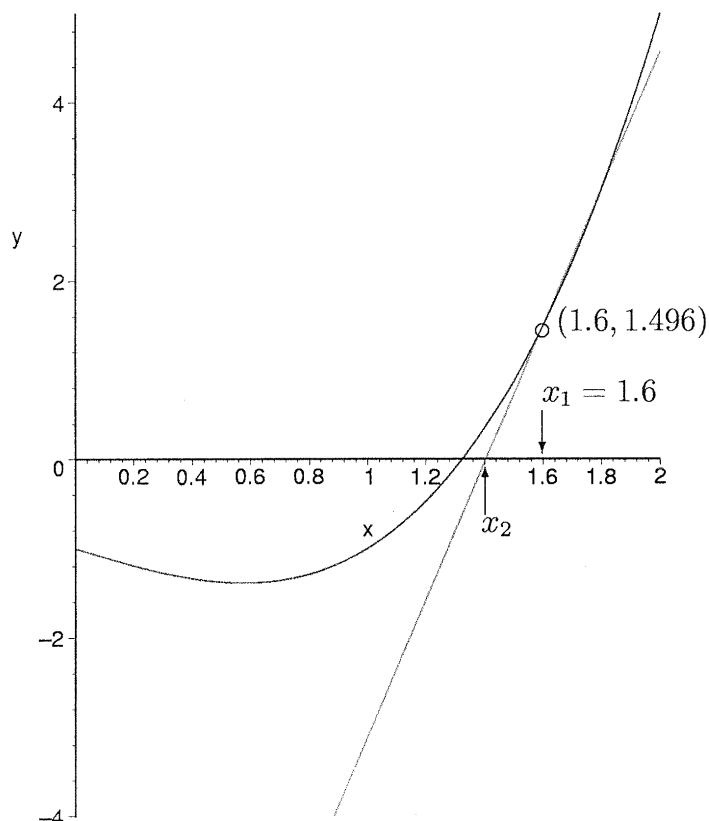
1. In Newton's method, if x_n is an approximation to a solution to an equation $f(x) = 0$, what is the formula for the next approximation, x_{n+1} ? [2 points]

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

2. Now let $f(x)$, with graph shown, be defined by:

$$f(x) = x^3 - x - 1$$

$$f'(x) = 3x^2 - 1$$



2.a. What is the equation of the tangent line at $x = 1.6$, sketched in the figure? [4 points]

$$\text{slope is } 3 \times (1.6)^2 - 1 \quad f(1.6) = 1.496$$

$$\text{so tangent line is } \frac{y - 1.496}{x - 1.6} = 3 \times 1.6^2 - 1 = 6.68$$

$$\Rightarrow y - 1.496 = 6.68(x - 1.6) = 6.68x - 6.68 \times 1.6 \\ = 6.68x - 10.688$$

$$\Rightarrow \boxed{y = 6.68x - 9.192}$$

2.b. Find x_2 . [4 points]

when $y = 0$ in equation for tangent line, get

$$6.68x_2 = 9.192 \Rightarrow x_2 = \frac{9.192}{6.68} \approx 1.376 \quad \boxed{\approx 1.376}$$

$$\text{note, this is the same as } 1.6 - \frac{f(1.6)}{f'(1.6)} = 1.6 - \frac{1.496}{6.68} \approx 1.376.$$