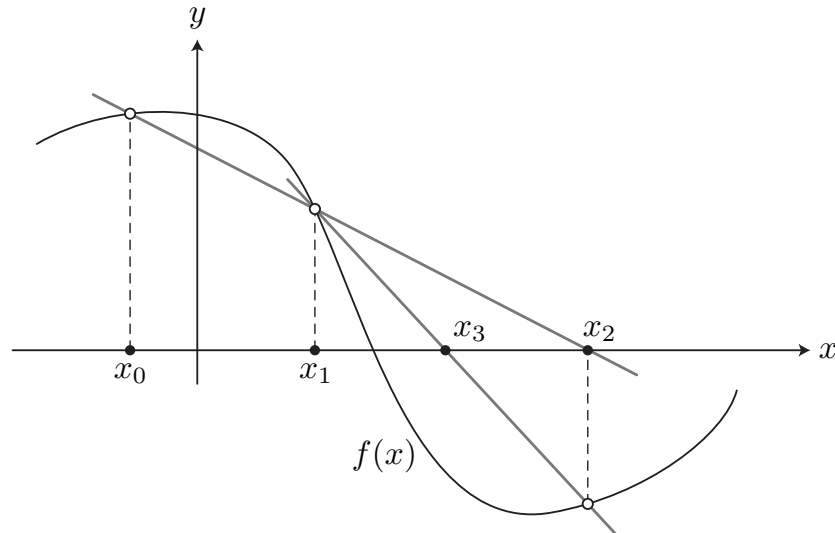


Physics 234: Quiz 5
Monday, March 14, 2011

Student's Name: _____

All three questions refer to the figure below.



1. Which of the following is a correct statement about the straight line passing through $(x_0, f(x_0))$ and $(x_1, f(x_1))$?

- (a) Its intercept with the horizontal axis at x_2 is a better approximation to the root of f than either x_0 or x_1 .
- (B) Its slope is a good approximation to $f'((x_0 + x_1)/2)$ [with errors at $O(x_1 - x_0)^2$]
- (c) As $x_1 \rightarrow x_0^+$, the approximation $f'(x_0) \approx (f(x_1) - f(x_0))/(x_1 - x_0)$ becomes more accurate and the numerical precision with which it can be computed in a floating-point scheme increases.
- (d) Its equation in Lagrange form is

$$f(x_0) \left(\frac{x - x_0}{x_1 - x_0} \right) + f(x_1) \left(\frac{x - x_1}{x_0 - x_1} \right).$$

- (e) It must intersect $f(x)$ an odd number of times.

2. Interpret the diagram as the initial step of the secant method. Make the geometric construction for the next iteration and identify the point x_3 . (Draw one straight line and one solid dot directly on the figure.)

3. Suppose that where $f(x)$ crosses the horizontal axis in the figure is the only root of f . Is the secant method sequence $(x_0, x_1, x_2, x_3, \dots)$ guaranteed to converge to that root for arbitrary initial guesses x_0 and x_1 ?

- (a) true
- (B) false