Pledge:

12/1/2006 | MATH261 Calculus I | Name: Solution
Dr. Lunsford | Quiz 13 | (20 Points Total)

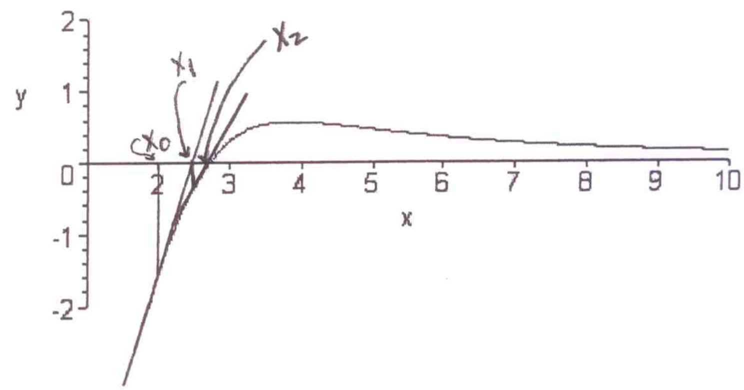
I. Use the graph given below to answer the following questions (4 points total).

(a) Using the starting point of $x_0 = 2$, graphically find the next two iterates, i.e. x_1 and x_2 of Newton's Method. Clearly indicate your answers! (2 points)

(b) Please answer "true" or "false" in the blank provided next to each statement according to which is correct. (1 point each – 2 total)

False If $x_0 = 3$ then Newtons Method will not converge to the zero between 2 and 3.

True If $x_0 = 6$ then Newtons Method will not converge to the zero between 2 and 3.



II. Use Newton's Method to approximate $\sqrt[3]{7.5}$ by finding a zero of the function $f(x) = x^3 - 7.5$. Please use $x_0 = 2$ to start Newton's method and list all iterates until you have reached the accuracy of your calculator display. (4 points)

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

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

$x_0 = 2$

$x_1 = 1.958333332$

$x_2 = 1.957434234$

$x_3 = 1.957433821$

III. Find all possible *antiderivatives* of the following functions. (4 points each, 8 total)

(a) $f(x) = \dfrac{x^2 + 2x + 10}{x} = x + 2 + 10x^{-1}$

$\int f(x)\,dx = \frac{1}{2}x^2 + 2x + 10\ln|x| + C$

(b) $f(x) = \sqrt[3]{x^2} + 3\sin(x) = x^{2/3} + 3\sin(x)$

$\int f(x)\,dx = \frac{3}{5}x^{5/3} - 3\cos(x) + C$

IV. A particle is located 5 meters from the origin on a straight path. Starting from rest, it moves along the path with acceleration $a(t) = t^2$ meters per second squared. Find the particle's location from the origin after 2 seconds. (4 points)

$a(t) = t^2$
$p(0) = 5$
$v(0) = 0$

$v(t) = \int a(t)\,dt = \frac{1}{3}t^3 + C$

$v(0) = 0 \Rightarrow C = 0$

$p(t) = \int v(t)\,dt = \int \frac{1}{3}t^3\,dt = \frac{1}{12}t^4 + C$

$p(0) = 5 \Rightarrow C = 5$

$p(t) = \frac{1}{12}t^4 + 5$

$p(2) = \frac{16}{12} + 5 = 6.25\text{ m}$ from the origin