Calculus Solutions: Chapter 4.10

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2. Let $f(x) = x^3 - 3x + 3$. Apply Newton's Method to find a zero of f, using each of the following initial values. Explain the results you obtain.

b) $x_1 = 0$

Solution:
First note that $f'(x) = 3x^2 - 3$. We have

$$x_2 = x_1 - \frac{3}{-3} = 1$$

which is a critical point of f.

□

d) $x_1 = .1$

Solution:

$$x_2 = .1 - \frac{2.701}{-2.97} = 1.00943$$

Repeating this process 12 times we see that we get close to -2.103803.

□

3b. Apply Newton's Method to find a zero of the following function starting with the indicated initial guess. Explain what happens.

Solution:
First we note that $f'(x) = \frac{1}{3}(x-1)^{-2/3}$. Applying Newton's method we get an imaginary number on the third iteration.

□

4. Find a zero of each function in each indicated interval. Give values to four decimal places.

We apply Newton's method to obtain the following solutions:

b) -.858094
d) $\pm 4.621134, \pm 1.591144$
h) .876726

□

5. Find all real zeros of the following functions.

b) -3.586375, .112681, 2.474194
f) .659046
j) -.451835, -2.932641, -6.357498, -9.394925
l) .680598, 3.141541

□