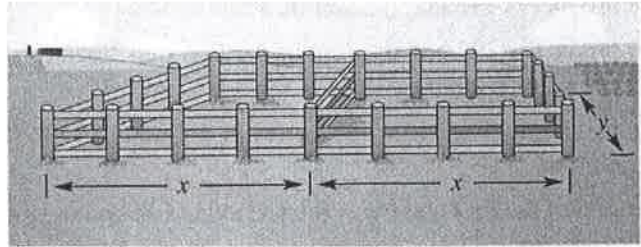You may use a calculator and your homework, but not your books or notes. There are two (2) problems worth 10 points each. **Show all of your work to receive full/partial credit.**

1) A rancher has 200 feet of fencing with which to enclose two adjacent rectangular corrals (see figure). What dimensions should be used so that the enclosed area will be a maximum?

Maximize Area

$$A = 2xy$$

$$A(x) = 2x\left(\frac{200}{3} - \frac{4}{3}x\right)$$

$$= \frac{400}{3}x - \frac{8}{3}x^2$$

$$A'(x) = \frac{400}{3} - \frac{16}{3}x = 0$$

$$\frac{16x}{3} = \frac{400}{3} \rightarrow 16x = 400$$

$$x = 25 \, ft$$

Secondary equation

$$4x + 3y = 200$$

$$3y = 200 - 4x$$

$$y = \frac{200}{3} - \frac{4}{3}x$$

$$y = \frac{200}{3} - \frac{4}{3}(25) = \frac{100}{3} \, ft$$

So $x = 25 \, ft$, $y = 33.\overline{3} \, ft$

2) Complete two iterations of Newton's Method for the function using the given initial guess.

$$f(x) = x^3 - 3, \qquad x_1 = 1.4$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \qquad\qquad f'(x) = 3x^2$$

$$x_2 = 1.4 - \frac{(1.4)^3 - 3}{3(1.4)^2} = 1.443554$$

$$x_3 = 1.443554 - \frac{1.443554^3 - 3}{3(1.443554)^2} = 1.442225$$