Embedded Questions for MAC 2311, and MAC 2281

1. Evaluate the limit:

$$\lim_{x \to 2} \frac{x^2 - 7x + 10}{x^2 - 4}$$

2. Evaluate $\frac{dy}{dx}$ for

$$y = (sin4x)(cos^2 3x)$$

3. Differentiate:

$$f(x) = e^{x\sqrt{x}} + \frac{\ln x}{x}$$

4. Find the tangent line to the curve at the point (2,3) :

$$x^2 + xy - y^2 = 1$$

5. An object moves along a line. The acceleration function is

$$a(t) = -2t. \quad \text{The initial velocity is } \; v(0) = 9.$$

   (a) Find the velociy function v(t).

   (b) For the time interval $0 \leq t \leq 5$, find the total distance travelled (Remember that total distance is the amount that would be registered on an odometer. It is not, necessarily, displacement.)

6. The length of a rectangle is increasing at a rate of 6 cm/sec, and its width is increasing at a rate of 7 cm/sec. When the length is 5 cm and the width is 8 cm how fast is the area of the rectangle increasing ?

7. Integrate:

$$\int_0^1 x(\sqrt[4]{x} + \sqrt{x})dx$$