5. Which of the following functions below satisfy the hypothesis of the MVT?

I. $f(x) = \dfrac{1}{x+1}$ on [0, 2]

II. $f(x) = x^{\frac{1}{3}}$ on [0,1]

III. $f(x) = |x|$ on [-1,1]

(A) I only (B) I and II only (C) I and III only (D) III only (E) none of them (F) all of them

1. You may use a calculator, but you must show all steps!!!

(a) Given the differential equation $\dfrac{dy}{dx} = x + 2$ and y (0) =3 .

Find an approximation for y (1) by using Euler's method with two equal steps.

(b) Solve the differential equation $\dfrac{dy}{dx} = x + 2$ with the initial condition y (0) =3 , and use your solution to find y (1).

3. For what value(s) of t does the curve given by the parametric equations $x = t^3 - t^2 - 1$ and $y = t^4 + 2t^2 - 8t$ have a vertical tangent?

7. Find the area between the loops of r = 1+ 2cosθ

17. Which of the following gives the slope of the polar curve r f = (θ) graphed in the xy-plane?

(A) dr /dθ   (B) dy /dθ (C) dx /dθ   (D) $\dfrac{dy/d\theta}{dx/d\theta}$ (E) $\dfrac{dy}{dx} \cdot \dfrac{dr}{d\theta}$

6. A toy car travels on a straight path. During the time interval 0 60 $\leq \leq$ t seconds, the toy car's velocity v, measured in feet per second, is a continuous function. Selected values are given below.

t (sec)	0	15	25	30	35	50	60
v t( ) (ft/sec)	−10	−15	−10	−7	−5	0	13

For 0 <t<60 , must there be a time t when v(t) = −2 ? Justify.