Calculus Chapter 10 Review   Name_____

1) Without using your calculator, find the length of the parametric curve $x = e^t \cos t$ and $y = e^t \sin t$ defined over the interval $0 \le t \le \pi$

2) A particle moves in the *xy*-plane so that its position at any time t, $0 \le t \le 3$ is given by

$x(t) = \dfrac{t^2}{2} - 3\ln(2 + t)$ and $y(t) = 3\sin \pi t$.

a) At what time t does $x(t)$ attain its minimum value? What is the position
$(x(t), y(t))$ of the particle at this time? Show the work that leads to your answer.

b) What is the speed of the particle at this time? Show the work that leads to your
answer. You may use your graphing calculator to evaluate.

c) At what values of t over the interval $0 < t < 3$ is the particle is on the *x*-axis?
Show the work that leads to your answer.

d) Set up the equation that will determine the total distance traveled by the particle
over the interval $0 \le t \le 3$. Evaluate this equation using your graphing calculator.

3) A curve is defined by the parametric equations $x = 3t - t^3$, $y = 3t^2$ over the interval $0 \le t \le 3$.

    a)   At what value(s) of t is the tangent line vertical?

    b)   Find the equation of the tangent line at $t = 2$.

    c)   Find d^2y/dx^2.

    d)   Without using your calculator, find the length of the parametric curve over the interval $0 \le t \le 3$.