(1) Find an equation of the tangent to the curve at the point corresponding to the given value of the parameter.
  (a) $x = t \cos t$; $y = t \sin t$; $t = \pi$
  (b) $x = 1 + 4t - t^2$; $y = 2 - t^3$; $t = 1$

(2) Find dy/dx and d^2y/dx^2. For witch values of t is the curve concave upward?
  (a) $x = t^2 + 1$; $y = e^t - 1$
  (b) $x = 2 \sin t$; $y = 3 \cos t$; $0 < t < 2\pi$

(3) Find the points on the curve where the tangent is horizontal or vertical. You can check your work with a graphing software.
  (a) $x = e^{\sin \theta}$; $y = e^{\cos \theta}$
  (b) $x = t^3 - 3t$; $y = t^2 - 3$; $0 < t < 2\pi$

(4) Consider the astroid
$$x = a \cos^3 \theta \quad y = a \sin^3 \theta$$
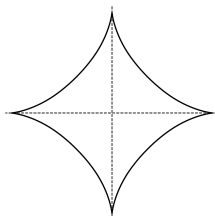
  (a) Find the slope of the tangent to the astroid in terms of θ.
  (b) At what points is the tangent horizontal or vertical?
  (c) At what points does the tangent have slope 1 or -1?
  (d) Set up the integral to find the area of the region enclosed by the astroid.

(5) Find the length of the following parametric curves.
  (a) $x = 1 + 3t^2$; $y = 4 + 2t^3$; $0 \le t \le 1$
  (b) $x = 3 \cos t - \cos 3t$; $y = 3 \sin t - \sin 3t$; $0 \le t \le \pi$