

**NCAAPMT Calculus Challenge Problem #11****Solutions Due April 1, 2008**

(Notice the due date is April 1, since many schools have spring break during this time period)

Consider the relation defined by the parametric equations

$$x(t) = \int_0^t \sin(v^2) dv$$

$$y(t) = \int_0^t \cos(v^2) dv$$

Use your calculator to sketch the graph of this relation.

- Write the equation of the line tangent to the curve at  $t = \sqrt{\pi}$ . (1 pt)
- Compute the curvature (NCAAPMT Calculus Challenge Problem #5) at  $t = \sqrt{\pi}$ . (1 pt)
- Find the length of the curve from  $t = 0$  to  $t = \sqrt{\pi}$ . (1 pt)
- Find the relationship between the length of the curve from  $t = 0$  to  $t = a$  and the curvature at  $t = a$  for this curve. (1 pt)
- As  $t \rightarrow \infty$ , the graph converges to a point. What are the coordinates of this point? (this one is really hard) (1 pt)