Carnegie Mellon University
21-122, Summer Session 2012

Fifth Homework, due August 6th

1. Sketch the Graph of the parametric equation given by $x = \sqrt{t}$, $y = 1 - t$ (hint: try to eliminate the parameter first).
2. Find the tangent line to the curve $x = e^{\sqrt{t}}$, $y = t - \ln(t)$, when $t = 1$.
3. Find the equation of the tangent(s) to $x = 2\sin(2t)$, $y = 2\sin(t)$ at $(\sqrt{3}, 1)$.
4. Find dy/dx and d^2y/dx^2 for the curve given by $x = 4 + t^2$, $y = t^2 + t^3$. For which values of t is the curve convex?
5. Find the length of the curve given by $x = e^t \cos(t)$, $e^t \sin(t)$, $0 \leq t \leq \pi$.
6. Find the total length of the astroid $x = a\cos^3\theta$, $y = a\sin^3\theta$, where $a > 0$.
7. Find the area of the surface obtained by rotating the astroid defined above about the x-axis.
8. Find the slope of the tangent line $r = 1/\theta$ at $\theta = \pi$.
9. Find the points at which the curve $r^2 = sin(2\theta)$ has a horizontal tangent line.
10. Find the area enclosed by the curve $r^2 = 4\cos(2\theta)$.