Sample Exam III Problems

1. Convert to Polar Coordinates: $(1,\sqrt{3})$.
2. Convert to Cartesian Coordinates: $(2,\frac{4p}{3})$.
3. Rewrite as Cartesian Equation and graph:
   a. $x=3t^2, y=3-2t.\ 0\le t\le 1.$
   b. $x=\sin 2t, y=\cos 2t, 0\le t\le \frac{p}{4}$
   c. $x=2\cos t, y=3\sin t.\ 0\le t\le 2p.$
   d. $x=4\sinh t, y=4\cosh t.\ 0\le t\le \ln 2.$
4. Find the lengths of the curves in Problem 3.
5. Find the equation of the tangent line of the curve $x=2t-1, y=t^2$ at $t=1.$
6. Find the surface area generated by rotating the curve $x=3t^2, y=2t^3,$ $0\le t\le 5$ about the $y-$ axis.
7. Find the equation of the tangent line at $q=\frac{p}{2}$ for the curve in 3c.
8. Sketch the equations for $0\le q\le 2p$. Exactly where is the tangent line horizontal? vertical?
   a. $r=2\sin q,$
   b. $r=\sin 2q.$
   c. $r=e^q.$
9. Find the length of the curve $r=5\cos q,\ 0\le q\le \frac{p}{4}.$
10. Find the area between the curves: $r=1-\cos q,\ r=\frac{3}{2}.$
11. Find the vertex, focus and directrix: $x^2-6x+8y=7.$ Sketch the graph.
12. Find vertex and foci and sketch. If a hyperbola, find the asymptotes.
    a. $x^2+\frac{y^2}{4}=1.$
    b. $\frac{y^2}{2}-\frac{x^2}{4}=1.$
    c. $2y^2-3x^2-4y+12x+8=0.$
13. Find the eccentricity, identify the conic, give the equation of the directrix, sketch the conic.
    a. $r=\frac{4}{1+3\cos q}$
    b. $r=\frac{5}{2-3\cos q}$