East Los Angeles College
Department of Mathematics
Math 262
Test 3
Take Home Portion
(25 points)

1. Evaluate the following improper integral

$$\int_0^{\infty} \frac{1}{x\sqrt{x^2-4}}\,dx$$

2. Let $F(s) = \int_0^\infty f(t)e^{-st}\,dt$ for a continuous function f(t) over $t \geq 0$ be a Laplace Transform for some function f. If $f(t) = e^t$, determine the domain of F(s). That is the values of s such that our improper integral convergences.

3. Consider the following parametric equations.

$x = e^{\sin(t)}$
$y = e^{\cos(t)}$

Determine the points on the curve that have horizontal and vertical tangents.

4. Consider the following parametric equations.

$x = t^2 + 1$
$y = e^t - 1$

Determine $\frac{dy}{dx}$ and $\frac{d^2x}{dy^2}$

5. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is rotated about the x-axis to form an ellipsoid. Determine the surface area of this ellipsoid.