Calculus II ESP **Worksheet#1** **Name:**

1. Find all continuous functions $f(x)$ which satisfy the equation

$$(f(x))^2 = \int_0^x f(t)\frac{t}{1+t^2}\,dt.$$

2. The graphs of $y = x^4 - 2x^2 + 1$ and $y = 1 - x^2$ intersect at three points. However, the area between the curves *can* be found by a single integral. Explain why this is so, and use the integral to compute the area.

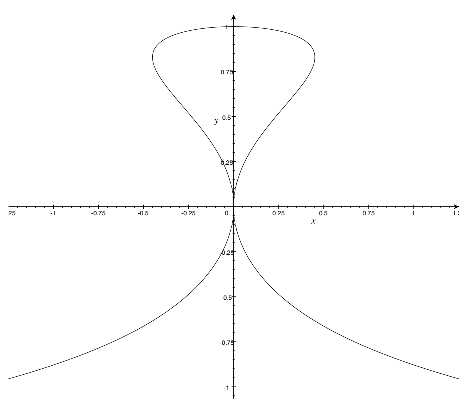
3. Compute the following integrals. In each case, think about whether substitution will be the best approach before you start.

   (a) $\displaystyle\int \frac{e^{sinx} cosx}{\sqrt{1 - e^{2sinx}}}\,dx$

   (b) $\displaystyle\int \frac{(sinx)^2 + sinx}{secx}\,dx$

   (c) $\displaystyle\int \frac{sin(\sqrt{x})}{\sqrt{x}cos^2(\sqrt{x})}\,dx$

4. Determine the area enclosed by the curve $x^2 = y^4(1 - y^3)$.



5. Evaluate $\displaystyle\int \frac{dx}{(2+\sqrt{x})^3}$ using $u = 2 + \sqrt{x}$.

6. Suppose a, b, and c are constants with $b^2 - 4ac = 0$. Find $\displaystyle\int \frac{1}{ax^2 + bx + c}\,dx$.