

Exam I Name _____ Section _____

1. Perform the following integration.

(a) $\int 8x\sqrt{1+3x^2} dx$

(b) $\int \arctan(2x) dx$

(c) $\int_0^1 \frac{3t}{1+4t^2} dt$

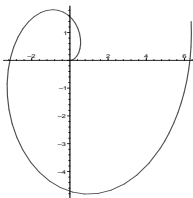
(d) $\int \frac{4-x}{x^2-5x+6} dx$

(e) $\int x\sqrt{4+x} dx$

2. Solve the initial value differential equation for $y(x)$.

$$\frac{dy}{dx} = \frac{xy}{\sqrt{1+x^2}} \quad y(0) = 2$$

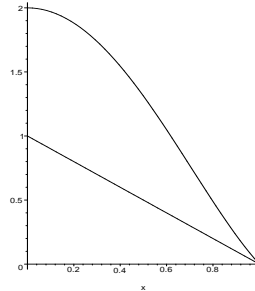
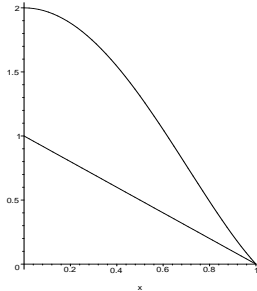
3. For $r(\theta) = \theta$, the spiral below:



(a) determine the parametric (vector) equations $\langle x(\theta), y(\theta) \rangle$.

(b) Using part(a), determine the tangent vector to $r(\theta) = \theta$ at $\theta = \frac{\pi}{4}$.

4. For the region bounded by the functions $f(x) = x^4 - 3x^2 + 2$ and $g(x) = 1 - x$ and the y -axis as pictured below:



- (a) Draw and label a volume element on the picture above and set up (do not evaluate) the integral for the volume of the solid formed by rotating this region about the x -axis.
- (b) Draw and label a volume element on the picture above and set up (do not evaluate) the integral for the volume of the solid formed by rotating this region about the y -axis.