

Math 143 Set 18

This exercise set reviews some of the concepts we have seen throughout the course.

1. Parameterize $\left\langle \frac{t}{\sqrt{1+t^2}}, \arctan t, \frac{1}{\sqrt{1+t^2}} \right\rangle$ by arclength.
2. Find the area enclosed by the polar equation $r(\theta) = \sin(2\theta)$.
3. Find the curvature and the unit tangent vector for the vector valued function $\mathbf{r}(t) = \langle a \cos t, b \sin t, 0 \rangle$.
4. The degree 5 Taylor polynomial for $\cos x$ is $1 - x^2/2! + x^4/4!$. Find a bound on the error when using this to approximate $\cos 3$.
5. Do these series converge? Which test are you using?
 - a. $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2 + \sqrt{n+1}}$
 - b. $\sum_{n=1}^{\infty} \frac{1 - 6^n}{1 + 2^n}$
 - c. $\sum_{n=1}^{\infty} \frac{n^2 + 2 \sin n}{(n+1)^5}$
6. Find the first three terms in the series of $e^x \sin x$.
7. Find the radius of convergence for $\sum_{n=1}^{\infty} \frac{(-1)^n}{2^n + 1} x^n$.
8. Find the series representations for $\sqrt{x} \sin(\sqrt{3x})$ and $(e^{-x^2} - 1)/x$.
9. Find the line tangent to the curve $\langle t \cos t, t^2, t \sin t \rangle$ at $(-\pi, \pi^2, 0)$.