

Exam 3  
No work = No credit!

1.  
a) Find an equation of the tangent line to the curve at the point corresponding to the value of the parameter.

$$x = e^{\sqrt{t}}$$

$$y = t - \ln t^3$$

$$t = 1$$

2. **Set up, but do not evaluate**, an integral that represents the length of the parametric curve

$$x = t - t^9$$

$$y = \frac{9}{8}t^{8/7}$$

$$\underline{3 \leq t \leq 12}$$

3. Find the interval of convergence of the series  $\sum_{n=1}^{\infty} \frac{(-1)^n x^n}{n+4}$ .

4. Use the binomial series to expand the function as a power series. Find the radius of convergence.

$$\frac{x}{\sqrt{16+x^2}}$$

5. Find a power series representation for  $f(x) = \ln(10 - x)$ .

6. Find the area of one petal of the rose curve given by  $r = 3 \cos(3\theta)$ .

7. **Set up, but do not evaluate,** the length of the arc from  $\theta = 0$  to  $\theta = 2\pi$  for the cardioid  $r = f(\theta) = 2 - 2\cos\theta$ .

8. Find the area between the loops of  $r = 1 + 2 \cos \theta$ .

9. Use power series to find the limit (if it exists).

$$\lim_{x \rightarrow 0} \frac{7x - \arctan(7x)}{x^3}$$

$$\arctan x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1}$$

10. Use the definition to find the Taylor series centered at 0 for the function  $f(x) = e^{2x}$ .