

Math 143 Sample Problems for Exam 2

Question 1 Find the interval of convergence of the power series:

$$\sum_{n=0}^{\infty} (-1)^n \frac{(3x+1)^n}{4^{2n}(n+1)}$$

Don't forget to check the endpoints!

Question 2 Approximate the definite integral $\int_0^1 x \cos(3x^3) dx$ by using the first three non-zero terms of the Maclaurin series for $f(x) = x \cos(3x^3)$. What is the maximum error in your approximation? You will need to know that $\cos x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$.

Question 3 Find the Taylor series for $f(x) = \cos x$ centered at the point $x = \pi/4$.

Question 4 For the parametric curve $x = e^t(\cos t + \sin t)$, $y = e^t(\cos t - \sin t)$, find the equation of the tangent line at the point where $t = \pi/4$. Find the length of the curve from $t = 0$ to $t = \pi/2$. Set up, but do not evaluate an integral that represents the area of the surface of revolution gotten by rotating the curve from $t = 0$ to $t = \pi/2$ about the y -axis.

Question 5 Find the area enclosed by the cardioid $r = 2 + 2 \cos \theta$. Find the equation of the tangent line to the cardioid at the point when $\theta = \pi/6$.

Question 6 Find the length of the spiral $r = 3^{-\theta}$ from $\theta = -\pi/2$ to $\theta = \pi/2$.

Question 7 Find the equation of the sphere whose diameter has endpoints $(1, 2, 3)$ and $(-1, 4, -6)$.

Question 8 Something from sections 13.2.