

MATH 1572H SAMPLE MIDTERM III PROBLEMS

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INSTRUCTOR: Anar Akhmedov

The midterm exam will cover the Sections 13.7, 13.8, 14.1 - 14.4, 14.6

1. Find the radius of convergence and interval of convergence of the series $\sum_{n=0}^{\infty} \frac{n(x+2)^n}{3^{n+1}}$
2. Find a power series representation for the function $f(x) = \frac{x}{5-x}$ and determine its interval of convergence.
3. Determine whether each of the following series converges or diverges. Show your reasoning.
 - a) $\sum_{n=0}^{\infty} (-1)^{n-3} \frac{\sqrt{n}}{n+4}$
 - b) $\sum_{n=2}^{\infty} \frac{\cos(n\pi)}{\sqrt{n}}$
4. Determine whether the given series converges absolutely, converges conditionally, or diverges. Show your reasoning.
 - a) $\sum_{n=1}^{\infty} (-1)^n \frac{2^n n!}{n^n}$
 - b) $\sum_{n=1}^{\infty} (-1)^n \sin^2(1/n)$
5. Find the Taylor Series for $f(x) = e^{-x}$ about $x = 0$.
6. Use power series to solve the differential equation $y'' = xy'$.