

MIDTERM #1

Math 135A

name

You must show all work for full credit. Use the backs of the test pages as necessary.

1. Determine whether or not the following series converge, making sure to indicate explicitly in each case which test you are using.

a. $\sum_{n=1}^{\infty} \sin n$

b. $\sum_{n=1}^{\infty} n^2 e^{-n}$

c. $\sum_{n=1}^{\infty} \frac{n^3+2n}{3n^4+8n}$

2. Evaluate the sum of the power series $\sum_{n=0}^{\infty} \frac{x^{2n}}{(2n)!}$.

3. Work out a power series expansion of $\int_0^x \sin(t^2) dt$ converging for all x . Do NOT attempt to evaluate the integral.

4. Find an interval in which the solution of the initial-value problem $(\ln t)y' + y = \cot t, y(2) = 3$, is guaranteed to exist. Do NOT attempt to solve this problem.

5. Find necessary and sufficient conditions on the constants A, B, C, D for the differential equation $(Ax + By) dx + (Cx + Dy) dy = 0$ to be exact.