

NAME(print in CAPITAL letters, first name first): _____

NAME(sign): _____

ID#: _____

Instructions: There are six problems. Make sure that you have all 6 problems.

Points received:

1

2

3

4

5

6

TOTAL

1. (24 points.) Suppose that $|x| < 1$. Find the sum of the series

$$1 + 2x + 3x^2 + 4x^3 + 5x^4 + \cdots$$

2. (24 points.) Use series to estimate the following integrals to within 10^{-8} .

(a) $\int_0^{0.1} \sin x^2 dx$

(b) $\int_0^{0.1} e^{-x^2} dx$

3. (24 points.)

(a) Find the Maclaurin polynomial of order 6 for e^{-x} .

(b) Use your answer from part (a) to estimate $1/e$.

(c) Find an upper bound for the error of your estimate in part (b). Use the alternating series approximation.

4. (24 points.) Let $f(x) = x^2 e^{x^2}$.

(a) Find the MacLauren series for $f(x)$.

(b) Find $f^{(7)}(0)$.

(c) Find $f^{(8)}(0)$.

(d) Find $f^{(9)}(0)$.

5. (24 points.) Consider the plane that passes through the points $(0, 1, 0)$, $(1, 2, 0)$, and $(0, 2, 1)$.
- (a) Find a vector normal to the plane.

- (b) Find an equation for the plane.

6. (12 points.) Find parametric equations for the line containing $(0, 2, 0)$ and $(1, 3, 5)$.