

YOUR NAME: _____

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Follow each step carefully (do not worry about convergence in this problem, but put your answers in \sum -form):

- (a) Find a power series representation of $\frac{1}{1+x^2}$

- (b) Find a power series representation of $\tan^{-1} x$.

- (c) Find a power series representation for $\int \frac{x - \tan^{-1} x}{x^3} dx$.

2. (a) Write a Taylor series for $f(x) = e^x$ at $a = 3$.

(b) Compute the value of $3 + \frac{9}{2!} + \frac{27}{3!} + \frac{81}{4!} + \cdots$

(c) Find a Maclaurin series for $f(x) = x^5 e^{x+3}$.