## Quiz 6

A Term, 2015

(5 points each) Show all work needed to reach your answers. If you need the value of any limit to reach your answer, please compute that value. For questions #1 and #2, please find a power series representation for each function, then for #1, give the radius of convergence.

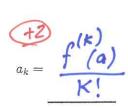
1-X = \( \int \) \( \times \) \

Series: Series:  $R = \frac{1}{2} \cdot f(x) = \int_0^x \frac{\sin t}{t} dt$  Since  $\sin t = \frac{1}{2} \cdot \frac{(-1)^{k-1}}{(2k-1)!} t$ 

Then I's sint de = 2 (-1) k-1 St 2k-2 (+1)

 $= \underbrace{\frac{(-1)^{k-1}}{2k-1}}_{K=1} \underbrace{\frac{2k-1}{2k-1}}_{(2k-1)!} \underbrace{\frac{2k-1}{2k-1}}_{X} \underbrace{\frac{(-1)^{k-1}}{2k-1}}_{X} \underbrace{\frac{2k-1}{2k-1}}_{X} \underbrace{\frac{(-1)^{k-1}}{2k-1}}_{X} \underbrace{\frac{2k-1}{2k-1}}_{X}$ 

3. Consider the power series  $\sum_{k=0}^{\infty} a_k(x-a)^k$ . If this power series equals f(x) for some  $f \in C^{\infty}$ , what are the values of the coefficients  $a_k$  in terms of f and its derivatives? Based on this power series, what power series represents f'(x).



4. If one wishes to approximate  $e^{-x}$  on the interval [0,1] by its Taylor polynomial  $P_n(x,x_0)$ with center  $x_0 = 0$ , what is a bound on the error?

 $e^{-X} - P_{n}(x,0) = R_{n}(x,0)$   $= R_{n}(x,0)$ for XEIO,17

One can also notice that this is an alternating Elics.