

Name _____

1. (3 points) Find $p_4(x)$, the Maclaurin polynomial of order 4 for $f(x) = \exp -x$. What common features do the functions $p_4(x)$ and $f(x)$ share?

2. (3 points) Find the interval of convergence for the following power series. You must thoroughly justify your claim.

$$1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \frac{x^8}{8!} + \cdots$$

3. (4 points) The following infinite series converges to a sum S .

$$S = \sum_{k=1}^{\infty} (-1)^{k+1} \frac{1}{\sqrt{k}} = 1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \frac{1}{\sqrt{5}} - \frac{1}{\sqrt{6}} + \cdots$$

(a) What two conditions are necessary for an alternating series to converge. Are those conditions met here?

(b) If we approximate the sum of the infinite series with

$$S \approx \sum_{k=1}^4 (-1)^{k+1} \frac{1}{\sqrt{k}} = 1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}},$$

then how can the error in our approximation be bounded? (fill in the blank below)

$$|\text{error}| \leq$$

(c) How many of the beginning terms of the infinite series could you add together to get an estimate for its sum S that was within 0.01 of the correct sum?