MATH 2300-016 QUIZ 10 (in class/take home average) Name: _____

1. [Memorization] What are the Taylor series for the following functions (centered at zero)?

   (a) $\sin x$

   (b) $\cos x$

   (c) e^x

   (d) $\dfrac{1}{1-x}$

   (e) $\ln(1+x)$

2. Consider the power series

$$\sum_{n=1}^{\infty} \frac{2^n}{\sqrt{n}}(x-1)^n$$

(a) Where is the power series centered?

(b) What is the radius of convergence of the power series?

(c) What is the interval of convergence of the power series?

3. Evaluate the limit

$$\lim_{x \to 0} \frac{1 + x^2 + x^4/2 - e^{x^2}}{x^6}.$$

4. Suppose the power series $\sum_{n=0}^{\infty} c_n (x-1)^n$ converges at $x = 3$ and diverges at $x = -3$. What can you say about the following series?

   (a) $\sum_{n=0}^{\infty} \frac{c_n}{2^n} (-1)^n$ Converges / Diverges / Not enough information

   (b) $\sum_{n=0}^{\infty} c_n 4^n$ Converges / Diverges / Not enough information

   (c) $\sum_{n=0}^{\infty} c_n (-1)^n$ Converges / Diverges / Not enough information

   (d) $\sum_{n=0}^{\infty} c_n 6^n$ Converges / Diverges / Not enough information

5. For this problem let $f(x) = 1 + xe^x$.

   (a) What is the third degree Taylor polynomial centered at zero for $f(x)$?

   (b) What is the Taylor series for $f(x)$ centered at zero?