MATH 2300-004 QUIZ 9   Name: _____

1. Given a function $f(x)$ that is infinitely differentiable at $x = a$, what is its Taylor series centered at a?

2. [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) $\ln(1+x)$

3. For this problem, let $f(x) = (1 + x)^{1/3}$

(a) Find $f'(x)$, $f''(x)$, and $f'''(x)$.

(b) What is the maximum M of $|f'''(x)|$ on the interval $[0, 1]$?

(c) What is $T_2(x)$, the second degree Taylor polynomial for f centered at $x = 0$?

(d) Use $T_2(x)$ to estimate $\sqrt[3]{2}$.

(e) Bound the absolute value of the remainder $R_2(1) = f(1) - T_2(1) = \sqrt[3]{2} - T_2(1)$ using Taylor's inequality and the bound M on $|f'''(x)|$ you found above.