1. Do but don’t turn in: memorize the formula for the $n$th-degree Taylor Polynomial for $f(x)$ centered at $x = a$:

$$T_n(x) = f(a) + f'(a)(x - a) + \frac{f''(a)}{2!}(x - a)^2 + \frac{f'''(a)}{3!}(x - a)^3 + \ldots + \frac{f^{(n)}(a)}{n!}(x - a)^n$$

$$= \sum_{i=0}^{n} \frac{f^{(i)}(a)}{i!}(x - a)^i$$

2. Find the 4th degree Taylor polynomial for $\tan x$ centered at $x = 0$.

3. The function $f(x)$ is approximated near $x = 0$ by the 3rd degree Taylor polynomial $T_3(x) = 4 - 3x + \frac{x^2}{5} + 4x^3$. Give the values of $f(0)$, $f'(0)$, $f''(0)$ and $f'''(0)$.

4. Find the 10th degree Taylor polynomial centered at $x = 1$ of the function $f(x) = 2x^2 - x + 1$.

5. Here’s a graph of $f(x)$:

![Graph of f(x)](image)

If the 2nd-degree Taylor polynomial centered at $a = 0$ for $f(x)$ is $T_2(x) = ax^2 + bx + c$, determine the signs of $a$, $b$ and $c$.

6. Show your work in an organized way.

   (a) Find the 7th degree Taylor polynomial centered at $a = 0$ for $\sin(x)$.

   (b) Use $T_7(x)$ to estimate $\sin(3^\circ)$. Don’t forget to convert to radians.

   (c) Compare your answer to the estimate for $\sin(3^\circ)$ given by your calculator or other technology. How accurate were you?

7. This problem asks for Taylor polynomials for $f(x) = \ln(1 + x)$ centered at $a = 0$. Show your work in an organized way.

   (a) Find the 4th, 5th and 6th degree Taylor polynomials for $f(x)$ centered $a = 0$.

   (b) Find the $n$th degree Taylor polynomial for $f(x)$ centered $a = 0$, written in expanded form.

   (c) Find the $n$th degree Taylor polynomial for $f(x)$ centered $a = 0$, written in summation notation.

   (d) Use the 7th degree Taylor polynomial to estimate $\ln(2)$.

   (e) Compare your answer to the estimate for $\ln(2)$ given by your calculator. How accurate were you?
(f) Looking at the Taylor polynomials, explain why this estimate is less accurate than the estimate in the previous problem for \( \sin(3^\circ) \).

8. Do, but don’t turn in: memorize the \( n \)th degree Taylor polynomials centered at \( a = 0 \) for \( e^x \), \( \sin(x) \), \( \cos(x) \), \( \ln(1 + x) \) and \( \frac{1}{1 - x} \). Be able to write each of them down with ease in both expanded form and sigma-notation.