Rutgers University
Math 152

**Section 10.8: Taylor and Maclaurin Series - Worksheet**

1. Find the Taylor polynomials for the following functions at the order and center indicated.

   (a) $f(x) = 2\cos\left(\frac{\pi}{3} - 5x\right)$, $T_4(x)$ at $a = 0$.

   (b) $f(x) = \sqrt[3]{4+2x}$, $T_3(x)$ at $a = 2$.

   (c) $f(x) = 2^{3-x}$, $T_4(x)$ at $a = 1$.

   (d) $f(x) = \ln(\cos(x))$, $T_3(x)$ at $a = \frac{\pi}{4}$.

   (e) $f(x) = \frac{6}{5-3x}$, $T_4(x)$ at $a = 1$.

   (f) $f(x) = \ln(5+x)$, $T_3(x)$ at $a = -4$.

2. In 1.(b), you found the third degree Taylor polynomial of $f(x) = \sqrt[3]{4+2x}$ centered at $a = 2$. Use this Taylor polynomial to estimate $\sqrt[3]{8.6}$.

3. Consider the function $f(x) = \displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n}{9^n(n+1)}(x-4)^{2n+1}$.

   (a) Find the radius and interval of convergence of $f$.

   (b) Find $f^{(7)}(4)$, $f^{(8)}(4)$ and $f^{(9)}(4)$.

4. Use the reference Maclaurin series to calculate the Maclaurin series of the following functions.

   (a) $f(x) = x^7\cos(4x^5)$.

   (b) $f(x) = e^{-x^3} - 1 + x^3$.

   (c) $f(x) = \sin(2x) - 2\tan^{-1}(x)$.