11.11 - Applications of Taylor Polynomials

11.11a

Exercises:

Find the Taylor polynomial $T_3(x)$ for the function f centered at the number a. Graph f and T_3 on the same screen.

$f(x) = \sin x, a = \frac{\pi}{6}$

$f(x) = e^{-x} \sin x, a = 0$

11.11b

Approximate f by a Taylor polynomial with degree n at the number a. (b) Use Taylor's Inequality to estimate the accuracy of the approximation $f(x) \approx T_n(x)$ when x lies in the given interval.
(c) Check your result in part (b) by graphing $|R_n(x)|$.
$f(x) = \sin x, a = \frac{\pi}{6}, n = 4, 0 \leq x \leq \frac{\pi}{3}$

11.11c

Use the information from the previous exercise to estimate $\sin 38^\circ$ correct to five decimal places.

11.11d

Approximate f by a Taylor polynomial with degree n at the number a.
(b) Use Taylor's Inequality to estimate the accuracy of the approximation $f(x) \approx T_n(x)$ when x lies in the given interval.
(c) Check your result in part (b) by graphing $|R_n(x)|$.
$f(x) = \ln(1 + 2x), a = 1, n = 3, 0.5 \leq x \leq 1.5$

11.11e

Use the Alternating Series Estimation Theorem or Taylor's Inequality to estimate the range of values of x for which the given approximation is accurate to within the stated error. Check your answer graphically.

$\cos x \approx 1 - \frac{x^2}{2} + \frac{x^4}{24}$ ($|\text{error}| < 0.005$)