Taylor Polynomials and Taylor's Inequality Calculus: 2nd Edition by Dennis Berkey

1*a*. Find the 3rd order Taylor polynomial for f(x) = ln(x + 1) centered at x = 0.

b. Then find the Lagrange Error Bound when x = .2

2*a*. Find the 3rd order Taylor polynomial for f(x) = e^x centered at x = 0.

b. Then use Taylors Inequality to find $|f(.4) - P_3(.4)| \le$ R at x = .4

3*a*. Find the 3rd order Taylor polynomial for f(x) = $\sin x$ centered at x = $\frac{\pi}{6}$.

b. Then use the Remainder Estimation Thm to find $|f(x) - P_3(x)| \le$ R at x = 32°

4*a*. Find the 2nd order Taylor polynomial for f(x) = $\cos x$ centered at x = $\frac{\pi}{4}$.

b. Then use the Remainder Estimation Thm to find $|f(x) - P_2(x)| \le$ R at x = 42°

5*a*. Find the 3rd order Taylor polynomial for f(x) = $\arcsin x$ centered at x = 0.

b. Then find the Lagrange Error Bound when x = .2

6*a*. Find the 1st order Taylor polynomial for f(x) = $\frac{\ln x}{x}$ centered at x = 1.

b. Then use Taylors Inequality to find $|f(1.2) - P_1(1.2)| \le$ R at x = 1.2

7*a*. Find the 1st order Taylor polynomial for f(x) = xe^{-2x} centered at x = 0.

b. Then use Taylors Inequality to find $|f(.2) - P_3(.2)| \le$ R at x = .2

8*a*. Find the 1st order Taylor polynomial for f(x) = $\sqrt{3 + x^2}$ centered at x = 1

b. Then find the Lagrange Error Bound when x = 1.2

Determine a bound on the accuracy of the given approximation for the indicated range of x

9. $\sin x \approx x,\qquad |x| < .05$

10. $\sin x \approx x - \frac{x^3}{3!},\qquad |x| < .15$

11. $\cos x \approx \frac{1}{2} - \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{3},\right),\qquad \left|x - \frac{\pi}{3}\right| < .05$

12. $\tan x \approx 1 + 2\left(x - \frac{\pi}{4}\right),\qquad \left|x - \frac{\pi}{4}\right| < \frac{\pi}{36}$

13. $\sqrt[3]{1+x} \approx 1 + \frac{x}{3}\qquad |x| < .025$

14. $ln x \approx (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3,\qquad |x-1| < ..1$

15. $\sqrt{1+x} \approx 1 + \frac{x}{2},\qquad 0 < x < .02$