Taylor Polynomials and Taylor's Inequality

Calculus: 2nd Edition by Dennis Berkey

Directions:
a) Find the Taylor polynomial $P_n(x)$ for the function at a.
b) Evaluate $P_n(c)$
c) Compare f(c) to $P_n(c)$ by determining how many decimal places the approximation is accurate to (Find the error bound)

1. $f(x)=\ln(x+1)$ $a=0$ $n=3$ $c=.2$

2. $f(x)=e^x$ $a=0$ $n=3$ $c=.4$

3. $f(x)=\sin x$ $a=\frac{\pi}{6}$ $n=3$ $c=32^\circ$

4. $f(x)=\cos x$ $a=\frac{\pi}{4}$ $n=2$ $c=42^\circ$

5. $f(x)=\sin^{-1}x$ $a=0$ $n=1$ $c=.2$

6. $f(x)=\frac{\ln x}{x}$ $a=1$ $n=2$ $c=1.2$

7. $f(x)=xe^{-2x}$ $a=0$ $n=2$ $c=.2$

8. $f(x)=\sqrt{3+x^2}$ $a=1$ $n=1$ $c=1.2$

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