

9.3

19)  $|R_n(x)| < 5 \times 10^{-4}$

$$\left| \frac{1}{5!} x^5 \right| < 5 \times 10^{-4}$$

$$x < \sqrt[5]{(5 \times 10^{-4}) 5!}$$

$$x < .570$$

f	$\sin x$
f'	$\cos x$
f''	$-\sin x$
f'''	$-\cos x$
f <sup>4</sup>	$\sin x$
f <sup>5</sup>	$\cos x$

x      x<sup>3</sup>  
~  
R<sub>n</sub>(x)

$$\frac{1}{(n+1)}$$

$$(2n+2)!$$

$$10^{-3} - 0$$

21)  $|R_n(x)| = \left| \frac{1}{3!} (10^{-3})^3 \right|$

$$\frac{1}{3!} 10^{-9}$$

$$\frac{1}{6} \cdot \frac{1}{1000000000}$$

f	$\sin x$
f'	$\cos x$
f''	$-\sin x$
f'''	$-\cos x$

$$\frac{1}{6,000,000,000}$$

$$20 \quad \left| \frac{1}{4!} (.5)^4 \right| = .003$$

$$22 \quad \begin{aligned} f & (1+x)^{1/2} \\ f' & \frac{1}{2}(1+x)^{-1/2} \\ f'' & -\frac{1}{4}(1+x)^{-3/2} \quad [-.01, .01] \end{aligned}$$

$$\left| \frac{1}{4(1+x)^{3/2}} \right| \left| \frac{\frac{1}{4} (.99)^{-3/2} (.01)^2}{2!} \right| = 1.269 \times 10^{-5}$$

$$32 \quad \begin{aligned} f & (1+x)^k & P_2(x) &= 1 + kx + \frac{k(k-1)}{2} x^2 \\ f' & k(1+x)^{k-1} \\ f'' & k(k-1)(1+x)^{k-2} \\ f''' & \end{aligned}$$

$$\begin{aligned} f & (1+x)^3 \\ f' & 3(1+x)^2 \\ f'' & 6(1+x) \\ f''' & 6(1+x)^0 = 6 \end{aligned}$$

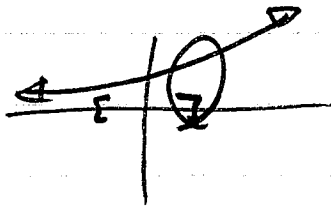
$$\begin{aligned} \frac{6}{3!} x^3 &< \frac{1}{100} \\ \sqrt{x^3} &< \sqrt[3]{\frac{1}{100}} \\ x &< \sqrt[3]{\frac{1}{100}} \approx .215 \end{aligned}$$

23)

$f$   
 $f'$   
 $f''$   
 $f'''$

$e^x$   
 $e^x$   
 $e^x$   
 $e^x$

$[-.1, .1]$   $e^{-1}$



$$\frac{e^{-1}}{3!} (0.1)^3$$