5.5 day 1

Sunday, November 19, 2017 8:30 PM

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L(x) = the tangent line at a=-4.

2. $f(x) = \sqrt{x^2+9}$, $a=-4$

$f'(x) = \frac{1}{2}(x^2+9)^{-1/2} \cdot 2x$

$= \frac{x}{\sqrt{x^2+9}}$

$f'(-4) = \frac{-4}{\sqrt{16+9}} = \frac{-4}{5}$

$f(-4) = \sqrt{25} = 5$

$L(x) - 5 = \frac{-4}{5}(x + 4)$

$L(x) = \frac{-4}{5}x - \frac{16}{5} + 5$

$L(x) = -\frac{4}{5}x + \frac{9}{5}$

b. $L(-3.9) = \frac{-4}{5} \cdot -3.9 + \frac{9}{5} = 4.92$

$f(-3.9) = \sqrt{(-3.9)^2+9}$

$= 4.9204$

|True − Approx| = Accuracy

Accuracy of L(x) at a=-4 is 0.000365

4. $f(x) = \ln(x+1)$, $a = 0$

$f'(x) = \frac{1}{x+1}$

$f'(0) = 1$

$f(0) = \ln 1 = 0$

b. $L(0.1) = 0.1$

$f(0.1) = \ln(1.1)$

$= 0.0953$

Accuracy = 0.0047

$L(x) - 0 = 1(x-0)$

$L(x) = x$

6 $f(x) = \cos^{-1} x \quad , \quad a = 0$

$f'(x) = \dfrac{-1}{\sqrt{1-x^2}}$

$f'(0) = \dfrac{-1}{\sqrt{1-0^2}} = -1$

$f(0) = \cos^{-1} 0 = \pi/2$

$L(x) - \frac{\pi}{2} = -1(x-0)$

$L(x) = -x + \dfrac{\pi}{2}$

b. $L(0.1) = -0.1 + \frac{\pi}{2} = 1.4708$

$f(0.1) = \cos^{-1} 0.1 = 1.4706$

Accuracy $= 0.000167$

12. $f(x) = \sqrt[3]{x}$

$f(26) \approx L(26)$ center at $a = 27$

$f'(x) = \frac{1}{3} x^{-2/3}$

$f'(27) = \frac{1}{3} 27^{-2/3} = \dfrac{1}{27}$

$f(27) = 3$

$L(x) - 3 = \frac{1}{27}(x-27)$

$L(x) = 3 + \frac{1}{27}(x-27)$

$$f(26) \approx L(26) = 3 + \frac{1}{27} \cdot -1$$

$$= \frac{80}{27}$$

14.

$$f(x) = \sqrt{x}$$

$f(80) \approx L(80)$ center at $a = 81$

$$f'(x) = \frac{1}{2} x^{-1/2}$$

$$f'(81) = \frac{1}{2} 81^{-1/2} = \frac{1}{18}$$

$$f(81) = 9$$

$$L(x) - 9 = \frac{1}{18}(x - 81)$$

$$L(x) = 9 + \frac{1}{18}(x - 81)$$

$$L(80) = 9 + \frac{1}{18}(80 - 81)$$

$$= \frac{161}{18}$$