

$$1) f'(x) = 3x - 2$$

$$L(x) = 7 + 10(x - 2) = 10x - 13$$

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

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

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

$$L(x) = 2 + 0(x - 1) = 2$$

$$4) f'(x) = \frac{1}{x+1}$$

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

$$5) f'(x) = \sec^2(x)$$

$$L(x) = 0 + 1(x - \pi) = x - \pi$$

$$6) f'(x) = \sec^2(x)$$

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

$$7)$$

$$f'(x) = k(1+x)^{k-1}$$

$$L(x) = 1 + k(x - 0) = 1 + kx$$

$$8a) 1 + 100(0.002) = 1.2$$

$$8b) 1 + \frac{1}{3}(0.009) = 1.003$$

$$11)$$

$$\text{Use } a = 100$$

$$f(x) = \sqrt{x} \quad f'(x) = \frac{1}{2\sqrt{x}}$$

$$L(x) = 10 + \frac{1}{20}(x - 100)$$

$$L(101) = 10 + \frac{1}{20}(101 - 100) = 10.05$$

12)

Use $a = 27$

$$f(x) = \sqrt[3]{x} \quad f'(x) = \frac{1}{3(\sqrt[3]{x})^2}$$

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

$$L(26) = 3 + \frac{1}{27}(26 - 27) = 2\frac{26}{27} \approx 2.963$$

13)

Use $a = 1000$

$$f(x) = \sqrt[3]{x} \quad f'(x) = \frac{1}{3(\sqrt[3]{x})^2}$$

$$L(x) = 10 + \frac{1}{300}(x - 1000)$$

$$L(998) = 10 + \frac{1}{300}(998 - 1000) = 9\frac{149}{150} \approx 9.993$$

14)

Use $a = 81$

$$f(x) = \sqrt{x} \quad f'(x) = \frac{1}{2\sqrt{x}}$$

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

$$L(101) = 9 + \frac{1}{18}(101 - 81) = 8\frac{17}{18} \approx 8.944$$