

$$1. \sqrt{35} \quad f(x) = \sqrt{x} \quad a=36 \quad x=35 \quad f'(x) = \frac{1}{2\sqrt{x}}$$

$$\sqrt{35} = f(35) \approx L(35) = \sqrt{36} + \frac{1}{2\sqrt{36}}(35-36)$$

$$= 6 + \frac{1}{12}(-1) = 6 - \frac{1}{12} = \boxed{\frac{71}{12}}$$

$$2. \ln(2.8) \quad f(x) = \ln x \quad a=e \quad x=2.8 \quad f'(x) = \frac{1}{x}$$

$$\ln(2.8) = f(2.8) \approx L(2.8) = \ln e + \frac{1}{e}(2.8-e)$$

$$= 1 + \frac{2.8}{e} - 1 = \boxed{\frac{2.8}{e}}$$

$$3. \sin(0.1) \quad f(x) = \sin x \quad a=0 \quad x=0.1 \quad f'(x) = \cos x$$

$$\sin(0.1) = f(0.1) \approx L(0.1) = \sin 0 + \cos 0[.1-0]$$

$$= 0 + 1(.1) = \boxed{0.1}$$

$$4. \sqrt[3]{999} \quad f(x) = \sqrt[3]{x} \quad a=1000 \quad x=999 \quad f'(x) = \frac{1}{3}x^{-\frac{2}{3}}$$

$$\sqrt[3]{999} = f(999) \approx L(999) = \sqrt[3]{1000} + \frac{1}{3}(1000)^{-\frac{2}{3}}[999-1000]$$

$$= 10 + \frac{1}{3}\left(-\frac{1}{10^2}\right)[-1] = 10 - \frac{1}{300} = \boxed{\frac{2999}{300}}$$

$$5. \tan(0.8) \quad f(x) = \tan x \quad a = \frac{\pi}{4} \quad x = .8 \quad f'(x) = \sec^2 x$$

$$\tan(0.8) = f(0.8) \approx L(0.8) = \tan \frac{\pi}{4} + \sec^2\left(\frac{\pi}{4}\right)\left[.8 - \frac{\pi}{4}\right]$$

$$= 1 + 2\left[.8 - \frac{\pi}{4}\right] = 1 + 1.6 - \frac{\pi}{2} = \boxed{2.6 - \frac{\pi}{2}}$$

$$6. \quad y = x^3 - 2x + 5 \quad x = 3 \quad dx = 0.02 \quad dy = ?$$

$$dy = (3x^2 - 2)dx \rightarrow dy = [3(3^2) - 2](.02) = 25(.02) = \boxed{.5}$$

$$7. \quad y = \sin(x^2 - 1) \quad x = 1 \quad dx = 0.01 \quad dy = ?$$

$$dy = 2x \cos(x^2 - 1) dx \rightarrow dy = 2(1) \cos(1^2 - 1)[.01] = \boxed{.02}$$

$$8. \quad 5 + x^2 y = y + x^3 y \quad x = 2 \quad dx = -0.02 \quad dy = ?$$

$$5 + 4y = y + 8y$$

$$5 = 5y$$

$$y = 1$$

$$x^2 dy + 2xy dx = dy + x^3 dy + 3x^2 y dx$$

$$dy = \frac{(3x^2 y - 2xy) dx}{x^2 - 1 - x^3} = \frac{(12 - 4)(-.02)}{4 - 1 - 8}$$

$$= \frac{-.16}{-5} = \boxed{.032}$$

$$9. \quad V = \frac{4}{3} \pi r^3$$

$$r = 3 \quad dr = .1$$

$$dV = 4\pi r^2 dr$$

$$dV = 4\pi(3^2)(.1) = \boxed{3.6\pi \text{ cm}^3}$$

$$10. \quad A = \frac{s^2 \sqrt{3}}{4}$$

$$s = 9 \quad ds = -.2$$

$$dA = \frac{s\sqrt{3}}{2} ds$$

$$dA = \frac{9\sqrt{3}}{2} (-.2) = \frac{-1.8\sqrt{3}}{2} = \boxed{-\frac{9\sqrt{3}}{10} \text{ in}^2}$$