**MATH 149 Homework 17 Solutions**



**Section 3.8 #8.** $f(x) = x - 2\sqrt{x+1} \Rightarrow f'(x) = 1 - \frac{1}{\sqrt{x+1}}$

Start with $x_0 = 5$

$$x_1 = 5 - \frac{f(5)}{f'(5)} = 4.8293$$

$$x_2 = 4.8293 - \frac{f(4.8293)}{f'(4.8293)} = 4.8284$$

} difference is less than 0.01

**Section 3.9 #10** $y = 2x+1 = f(x) \Rightarrow f'(x) = 2$

$\Delta y = f(2.01) - f(2)$ $\qquad dy = f'(2)\,dx$

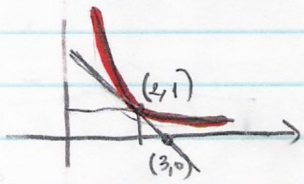
$\Delta y = (2\cdot(2.01)+1) - (2\cdot 2+1)$ $\qquad dy = 2\cdot(0.01) = 0.02$

$= 0.02$

$\Delta y$ and $dy$ are the same.

**#22.** $dy = f'(2)\,dx$ because 1.97 and 2.04 are close to 2.

$f'(2) =$ slope of the tangent line $= \frac{1-0}{2-3} = -1$




For 1.9, $dx = 1.9 - 2 = -0.1$

$dy = -1\cdot(-0.1) = +0.1$ so $f(1.9) \cong 1 + 0.1$

$\cong 1.1.$

For 2.04, $dx = 2.04 - 2 = +0.04$

$dy = -1\cdot(0.04) = -0.04$ so $f(2.04) \cong 1 - 0.04 \cong 0.96$

**#30.** edge of the cube = 12 inches

error = 0.03 in. $\Rightarrow dx = 0.03$

**a)** volume $= V = x^3$ $\qquad x$: edge

error in volume $= dV = 3x^2\,dx$

$dV = 3\cdot 12^2\cdot(0.03) = 12.96$

So, error in volume is $\pm 12.96\ in^3$.

**b)** Area: $A = 6x^2$

error in Area $= dA = 12x\,dx$

$dA = 12\cdot 12\cdot(0.03) = 4.32$, So error in area is $\pm 4.32\ in^2$

**#44.** Estimate $\sqrt[3]{26}$. let $f(x) = x^{1/3}$. Then $f'(x) = \frac{1}{3x^{2/3}}$

We have $f(27) = 3$

$f'(27) = \frac{1}{27}$ $\qquad$ Then $f(26) \cong f(27) + f'(27)\,dx$

$\cong 3 + \frac{1}{27}(-1) = \underline{\underline{2.9630}}$

When $x = 26$ we have $dx = 26 - 27 = -1$

**actual value** $\sqrt[3]{26} = 2.9625$