Problem #1

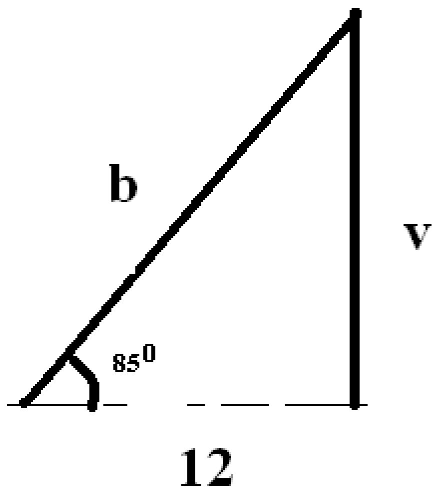
$f(x) = 3a^2 + 8x - 4$;

$f(x+h) = 3a^2 + 8(x+h) - 4$; (x) has been substituted by (x+h).

$$D = \frac{f(x+h) - f(x)}{h} = \frac{3a^2 + 8(x+h) - 4 - (3a^2 + 8x - 4)}{h} =$$

$$= \frac{3a^2 + 8x + 8h - 4 - 3a^2 - 8x + 4}{h} = \frac{8h}{h} = 8$$

Problem #2



Vertical portion (v):
tan(85)= v/12
v=12*tan(85)=12*11.43=137.16 feet

Hypotenuse (b):
cos(85)=12/b
b=12/cos(85)=12/0.087=137.93 feet

Total height:
S=v+b=137.16+137.93=275.09 feet

Problem #3

$y = 3x^2 + 7x - 8$.

(y) has been equated to 0:

$0 = 3x^2 + 7x - 8$;

$$x = \frac{-7 \pm \sqrt{7^2 - 4 \cdot 3 \cdot (-8)}}{2 \cdot 3} = \frac{-7 \pm \sqrt{49 + 96}}{6} = \frac{-7 \pm \sqrt{145}}{6}$$

1. $x = \frac{-7-\sqrt{145}}{6} = -3.174;$

2. $x = \frac{-7+\sqrt{145}}{6} = 0.840;$

Vertex

$$x_v = \frac{-(7)}{2(3)} = -\frac{7}{6} = -1.167;$$

$$y_v = 3(-\frac{7}{6})^2 + 7(-\frac{7}{6}) - 8 =$$

$$= -\frac{3(49)}{36} - \frac{49}{6} - 8 = \frac{-147-294-288}{36} = -\frac{729}{36} = -20.25$$

Vertex: (-1.167 ; -20.25)