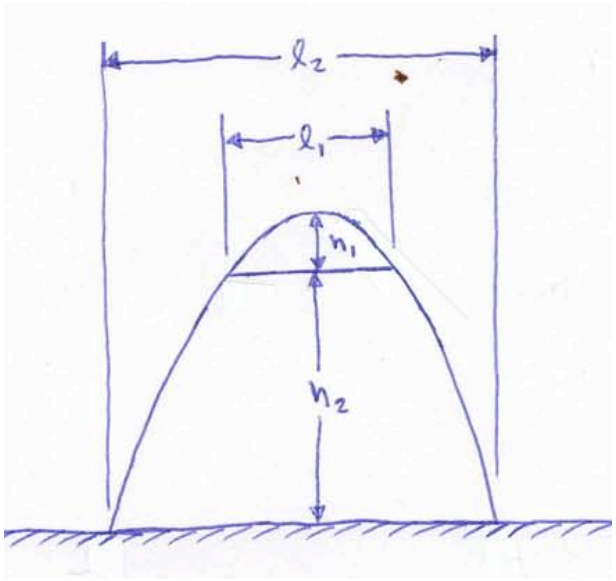
(5 marks) Suppose you are building a hall that is parabolic in cross section as shown in the figure.
If the hall has the following parameters:

bottom platform width (L2) = 20 m
top ceiling width (L1) = 10 m
height between ceiling and platform (h2) = 20 m

determine h1



(5 marks) A hydro wire hanging between two poles could be expressed with a 2nd order polynomial. If the hydro poles are 50m apart and the maximum sage in the wire is 2m, determine the equation of the wire between the two poles.

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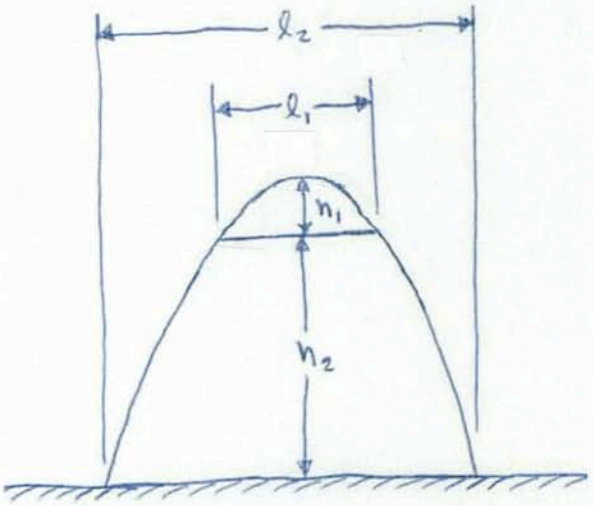
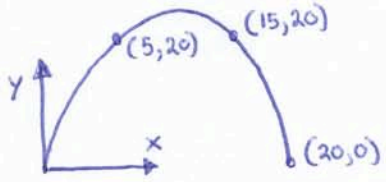




$y = a(x-m)(x-n)$

$= a(x-0)(x-20)$

sub (5,20):

$20 = a[5]([5]-20)$

$a = -\frac{4}{15} = -0.2667$

so

$$y = -\frac{4}{15}(x)(x-20)$$

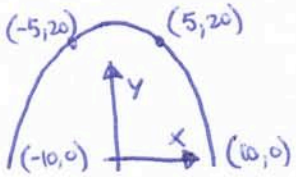
Find h_1

$y = -\frac{4}{15}(10)(10-20)$

$= 26.67$

$h_1 = 26.67 - 20$

$h_1 = 6.67$ m



$y = a(x-m)(x-n)$

$= a(x+10)(x-10)$

sub (5,20)

$20 = a(5+10)(5-10)$

$a = -\frac{4}{15} = -0.2667$

so

$$y = -\frac{4}{15}(x+10)(x-10)$$

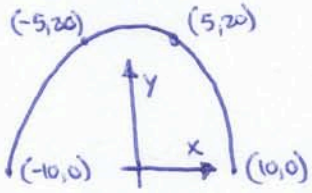
Find h_1

$y = -\frac{4}{15}(0+10)(x-10)$

$= 26.67$

$h_1 = 26.67 - 20$

$h_1 = 6.67$ m



$y = a(x-h)^2 + k$

$= a(x-0) + k$

sub (-10,0)

$0 = a(-10)^2 + k$

$k = -100a$ (1)

sub (-5,20)

$20 = a(-5)^2 + k$

$20 = 25a + k$

sub in (1)

$20 = 25a + [-100a]$

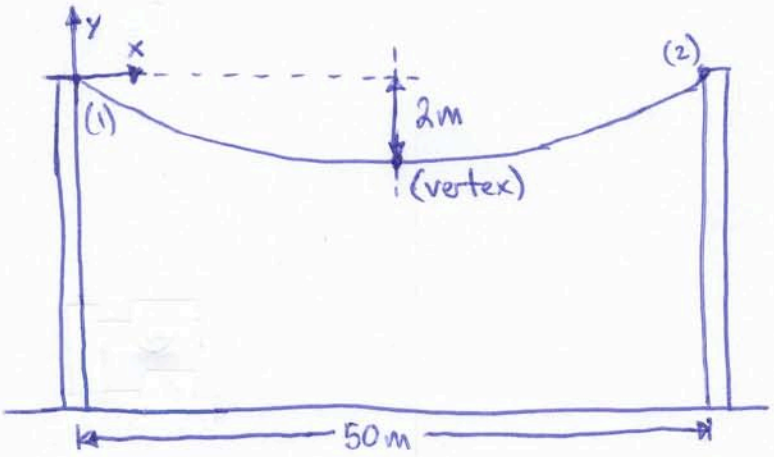
$a = -\frac{4}{15} = -0.2667$

$k = -100[-\frac{4}{15}] = 26.67$

$h_1 = 26.67 - 20$

$h_1 = 6.67$ m

(5 marks) A hydro wire hanging between two poles could be expressed with a 2nd order polynomial. If the hydro poles are 50m apart and the maximum sage in the wire is 2m, determine the equation of the wire between the two poles.



use $y = a(x-h)^2 + k$

by observation of vertex:

$h = \frac{50}{2} = 25$

$k = -2$

so

$y = a(x-25)^2 + (-2)$

solve for "a" using point 1

$0 = a(0-25)^2 - 2 \Rightarrow a = \frac{2}{(-25)^2} = 0.0032$

solver for "a" using point 2 (check)

$0 = a(50-25)^2 - 2 \Rightarrow a = \frac{2}{25^2} = 0.0032$

so

$$\boxed{y = (0.0032)(x-25)^2 - 2}$$

use $y = a(x-m)(x-n)$

by observation of roots:

$m = 0$

$n = 50$

solve for "a"

$-2 = a(25)(25-50) \Rightarrow a = \frac{-2}{(25)(-25)} = 0.0032$

so

$$\boxed{y = (0.0032)(x)(x-50)}$$