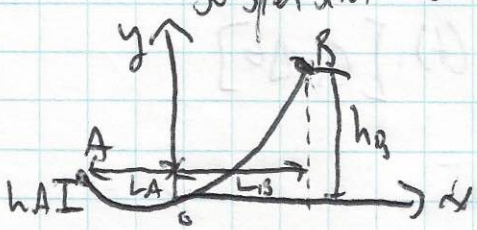
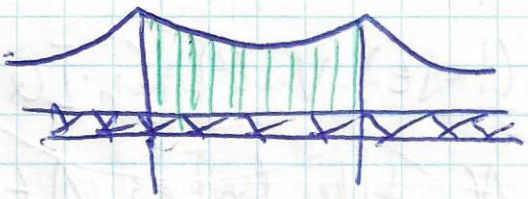
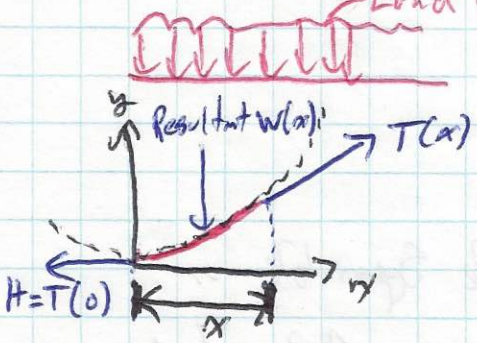
Hanging Cables

Suspension Bridge







$\rightarrow \sum F = 0,\ T\cos\theta - H = 0$ (1)

$\uparrow \sum F_y = 0,\ T\sin\theta - w(x) = 0$ (2)

$\frac{(2)}{(1)}$: $\tan\theta = \frac{w(x)}{H}$, $\tan\theta$ = slope of cable = $\frac{dy}{dx}$

$\therefore \frac{dy}{dx} = \frac{w(x)}{H}$

$w(x)$ = resultant = $\int_0^x w(x)\,dx$ i.e. $\frac{d}{dx}\int_0^x w(x)\,dx = w(x)$

$= \frac{1}{H}\int_0^x w(x)\,dx$

For design purposes, consider $w(x) = w$ = constant

$\frac{d^2y}{dx^2} = \frac{1}{H}w(x) = \frac{w}{H}$, 2nd order, immediately integrate