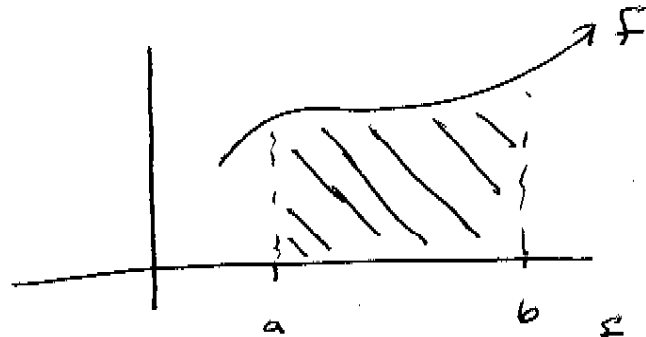


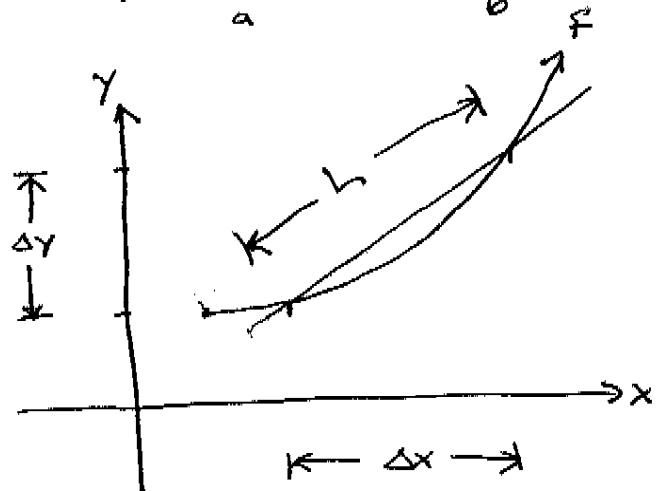
9.1
1/2

Arclength

We can find
the area under
the curve.



What about the
length of the
curve?



$$L = \sqrt{(\Delta x)^2 + (\Delta y)^2}$$

$$L = \sqrt{(\Delta x)^2 + \frac{(\Delta y)^2 (\Delta x)^2}{(\Delta x)^2}}$$

$$L = \sqrt{1 + \left(\frac{\Delta y}{\Delta x}\right)^2} \Delta x$$

$$\text{Now } \lim_{\Delta x \rightarrow 0} \sqrt{1 + \left(\frac{\Delta y}{\Delta x}\right)^2} \Delta x = \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$$

So, it seems reasonable that if f' is
continuous on $[a, b]$, then the length of
the curve $y = f(x)$ on $[a, b]$ is

$$L = \int_a^b \sqrt{1 + [f'(x)]^2} dx$$

9,1
2/2

Ex 1: Find the length of the curve $y = \frac{1}{3}(x^2+2)^{3/2}$ on $[0,1]$.

Ex 2: Find the arclength of $x = \frac{1}{3}\sqrt{y}(y-3)$ on $0 \leq y \leq 9$. (must play w/ the algebra).

Ex 3: Find the arclength of $y = x^2$ on $[0,1]$ (use trig substitution).