FAR BEYOND

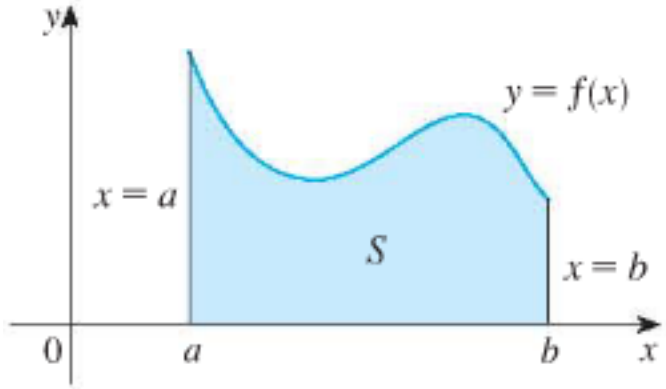
MAT122

Area Under Standard Shapes

Stony Brook University

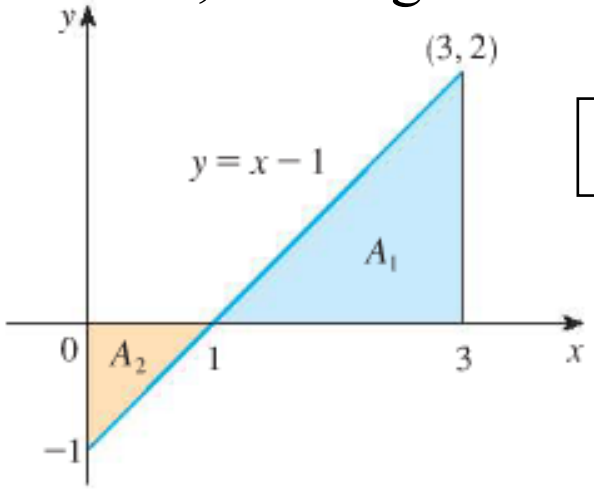
Area Under a Curve - Intro

It becomes a challenge to determine areas of non-standard shapes such as the bound area under a function curve.



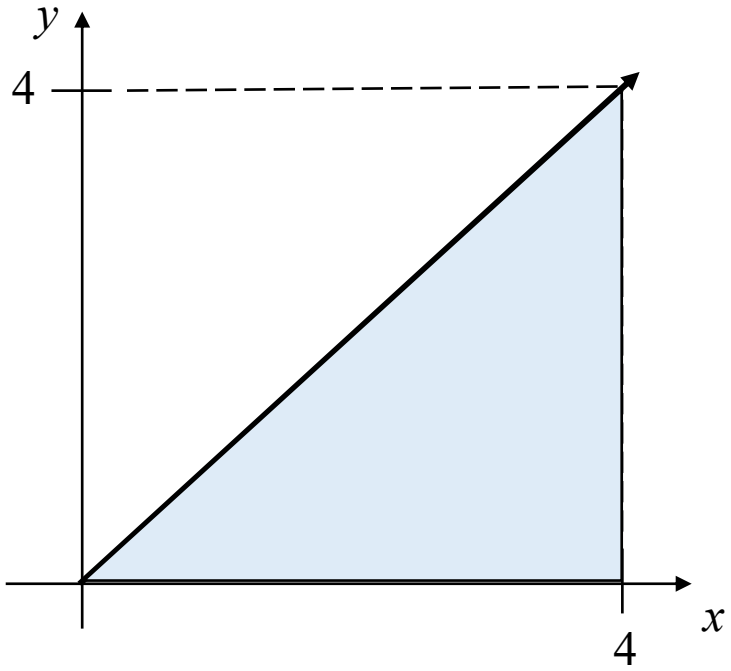
If area under curve is a <u>standard</u> shape, e.g., rectangle, triangle, circle, trapezoid then known area formulas can be used.

Caveat: If area lies **below** x-axis, that region will be <u>negative</u> (subtracted).

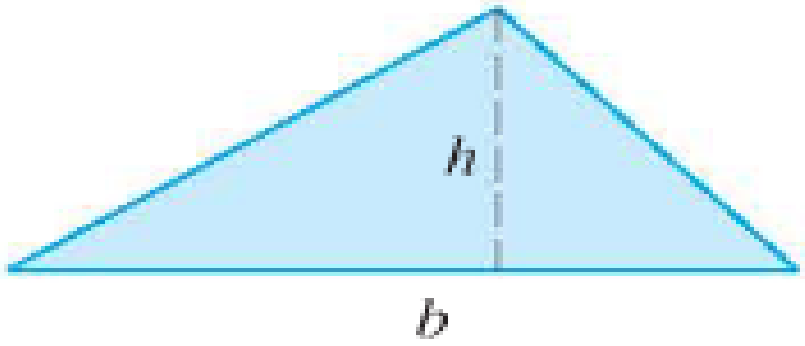


Total area of shaded regions: $A_1 - A_2$

Area Under a Line - Triangle



Area of a Triangle:

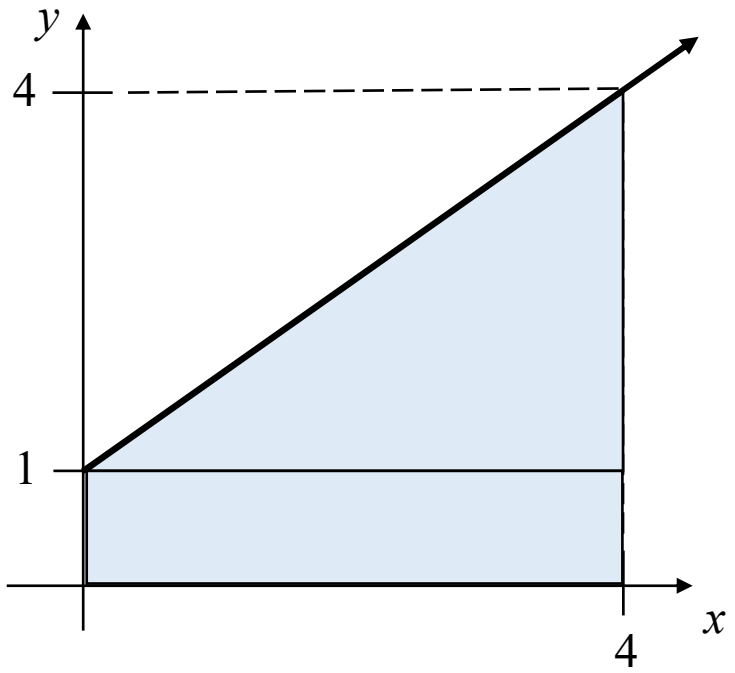


$$A = \frac{1}{2}bh$$

ex. Find the area under the line from $x = 0$ to $x = 4$.

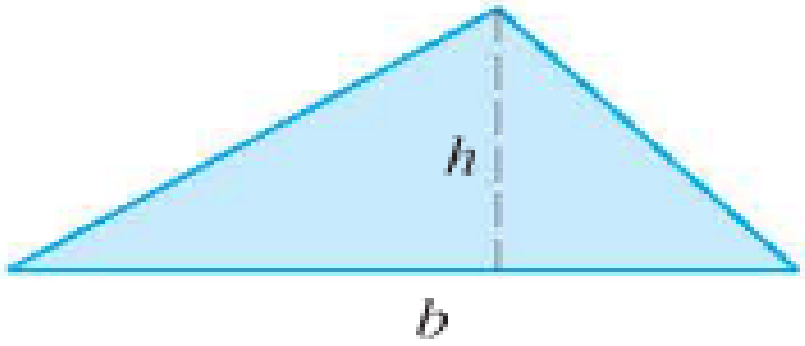
$= \boxed{8}$

Area Under a Line – Triangle, Rectangle



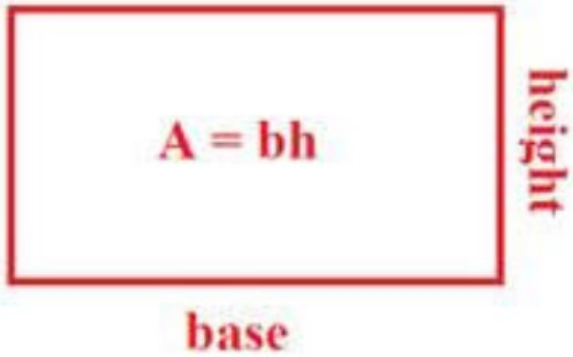
ex. Find the area under the line from $x = 0$ to $x = 4$.

Area of a Triangle:



$$A = \frac{1}{2}bh$$

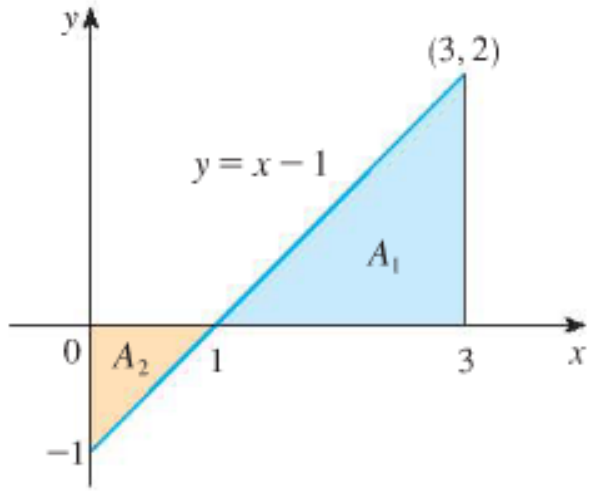
Area of a Rectangle:



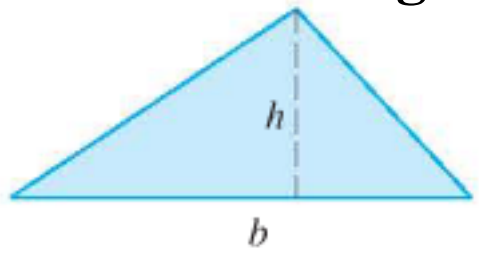
$$= \boxed{10}$$

Area Under a Line – with negative

ex. Calculate shaded area under $y = x - 1$ between $x = 0$ and $x = 3$.



Area of a Triangle:



$A = \frac{1}{2}bh$

$$= \boxed{1\frac{1}{2}}$$

Total area of shaded regions: $A_1 - A_2$

Integration Application

ex. A concert promoter sells x tickets and has a marginal-profit given by $P'(x) = 2x - 150$, where $P'(x)$ is in dollars/ticket. Find the <u>total</u> profit, $P(x)$, from the sale of the first 300 tickets.

$$A_{\Delta} = \frac{1}{2}bh$$

$= \boxed{\$45,000}$