## Sections 5.4: Indefinite Integrals and the Net Change Theorem
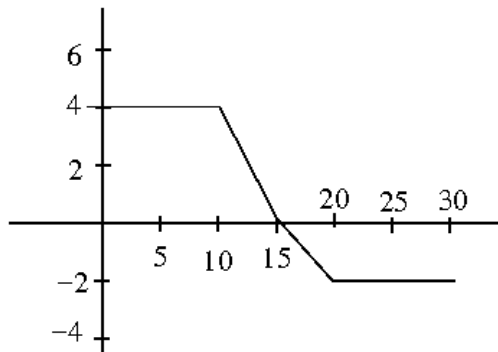
Example: Sketch the area enclosed by $x = 4y - y^2$ and $x = 0$ and then find the area.

Example: Sketch the area enclosed by $y = \sqrt[3]{x}$, $x = 0$, and $y = 8$ and then find the area.

**Net Change Theorem** The integral of a rate of change is the net change:

$$\int_a^b f'(x)dx = f(b) - f(a)$$

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Example: Use the graph of $f'(x)$ to answer these questions.



A) Which is larger? $f(15)$ or $f(25)$

B) Which is larger? $f(10)$ or $f(20)$

C) If $f(5) = 30$, find $f(20)$.

Example: A particle is moving in straight line motion that is expressed by the formula: $v(t) = t^2 - t - 6$ (measured in meters per second).

A) Find the displacement from $t = 1$ to $t = 4$.

B) Find the total distance traveled from $t = 1$ to $t = 4$.