Recall: FTC - 1

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Evaluate:

$$\frac{d}{dx}\int_3^x (2t^2 - 5t)\,dt$$

$$\frac{d}{dx}\int_x^7 \left(\sin t - \frac{1}{3}t^3\right)dt$$

$$\frac{d}{dx}\int_{2x}^{x^2} \frac{1}{2t+e^t}\,dt$$

FTC - II

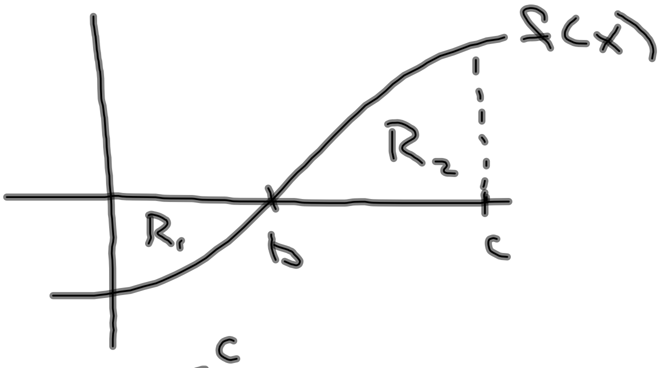
If f is continuous at every point on $[a,b]$ and F is the antiderivative on $[a,b]$

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

Evaluate:

$$\int_{-1}^{3} (x^2 + 2x)\,dx \; ; \; F(x) = \frac{1}{3}x^3 + x^2$$

Net Area vs Total Area



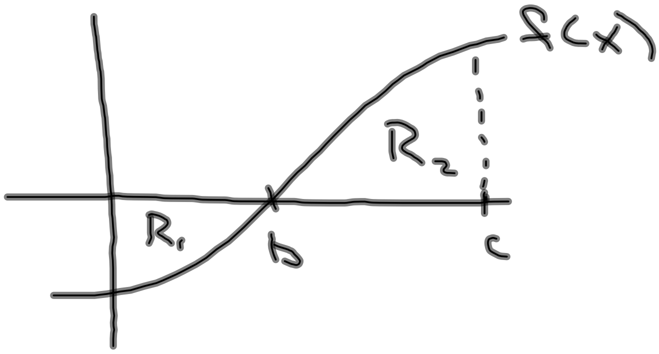
Does $\int_0^c f(x)\,dx$ give total area?

Total Area:

① $-\int_0^b f(x)\,dx + \int_b^c f(x)\,dx$

② $\int_b^0 f(x)\,dx + \int_b^c f(x)\,dx$

③ $\int_0^c |f(x)|\,dx$



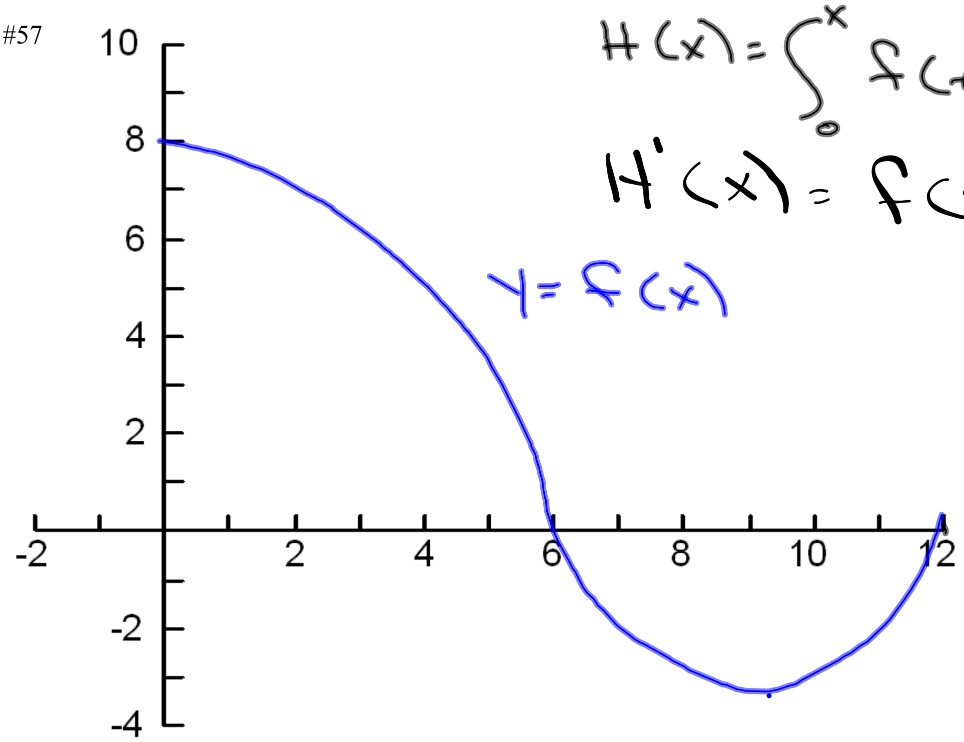
Pg 303 #27 - 41 odd, 45, 47

Pg 304 #57-59, 65-70

#57

$H(x) = \int_0^x f(t)\,dt$

$H'(x) = f(x)$



a) Find H(0) $H(0) = \int_0^0 f(t)\,dt = 0$

b) On what interval is H(x) increasing? Why?

$H'(x) = f(x) > 0$

c) On what interval is the graph of H(x) concave up? Why?

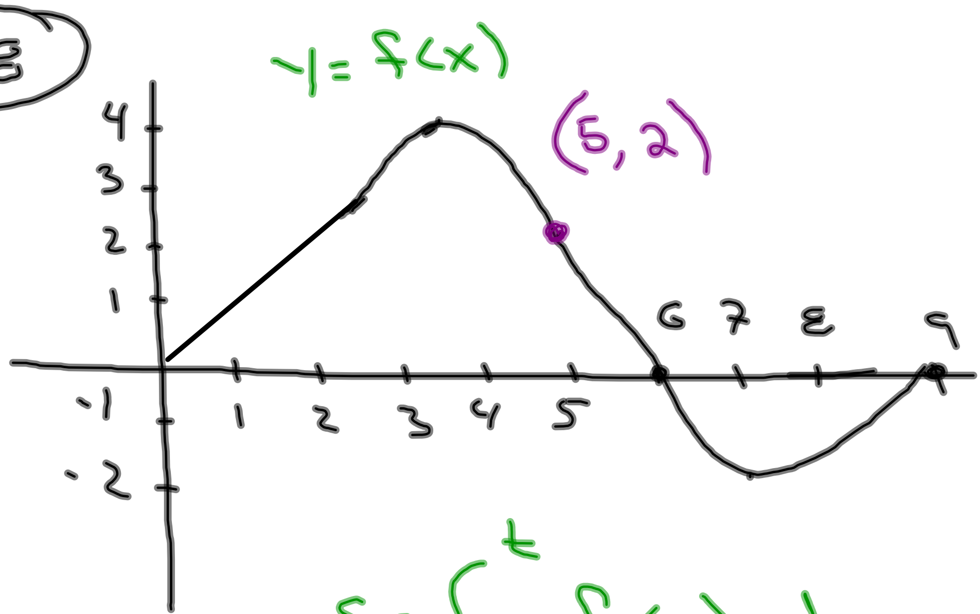
$H''(x) = f'(x) > 0$

d) Is H(12) positive or negative?

$H(12) = \int_0^{12} f$

e) Where does H achieve its maximum and minimum values? Why?

5g

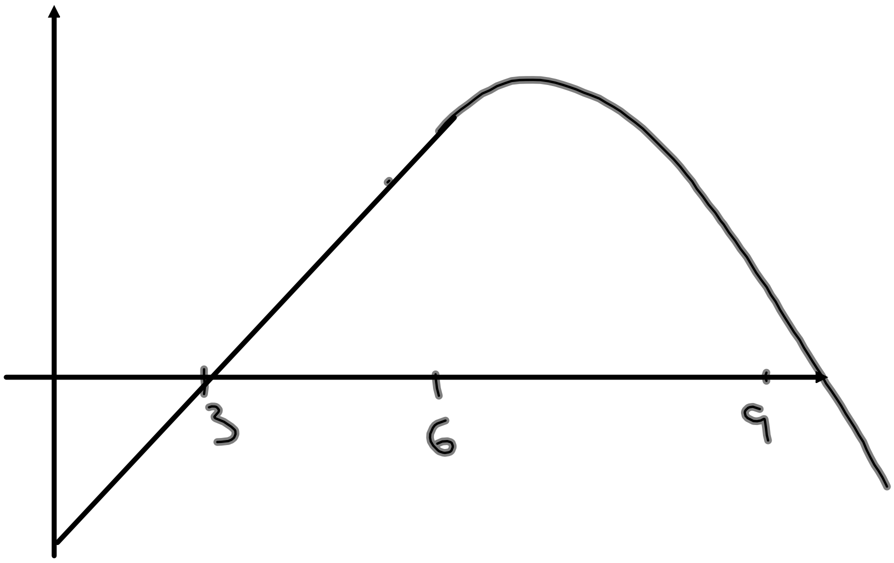


$$s = \int_0^t f(x)\,dx$$

$s(t)$ = position

$v(t) = s'(t) = f(t)$

$a(t) = v'(t) = s''(t) = f'(t)$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6
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