Chapter 5, Section 5.3, Question 2

Find the area under $P = 75(0.8)^t$ between $t = 0$ and $t = 7$.

Round your answer to two decimal places.

Area = 265.62

$P(t) = 75(0.8)^t$

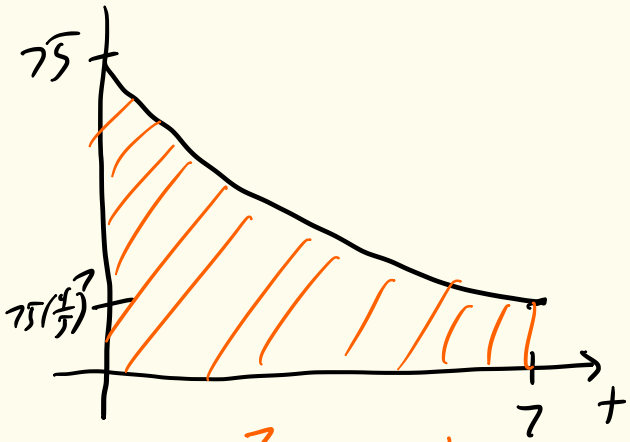
$= 75\left(\frac{4}{5}\right)^t$

$P(0) = 75 \cdot (0.8)^0$

$= 75 \cdot 1 = 75$

$\frac{4}{5} > \left(\frac{4}{5}\right)^2 > \left(\frac{4}{5}\right)^3$

since $0 < \frac{4}{5} < 1$



$\text{Area} = \int_0^7 75(0.8)^t\,dt$

$\approx 265.6198\ldots$

Exact: $\int_0^7 75(0.8)^t\,dt = 75\int_0^7 (0.8)^t\,dt = 75\left[\frac{1}{\ln(0.8)}(0.8)^t\right]_{t=0}^{t=7}$

(LATER!)

Area Between Curves

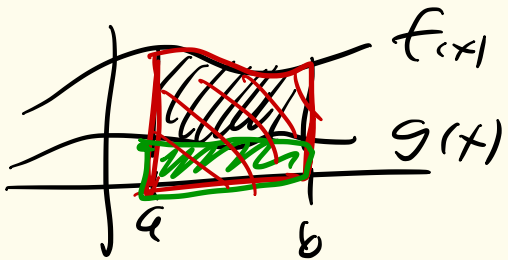
Suppose $g(x) \le f(x)$ over $[a, b]$

$$\text{Area} = \int_a^b f(x) - g(x)\,dx$$

top − bottom

$$\text{Area} = \int_a^b f(x)\,dx$$

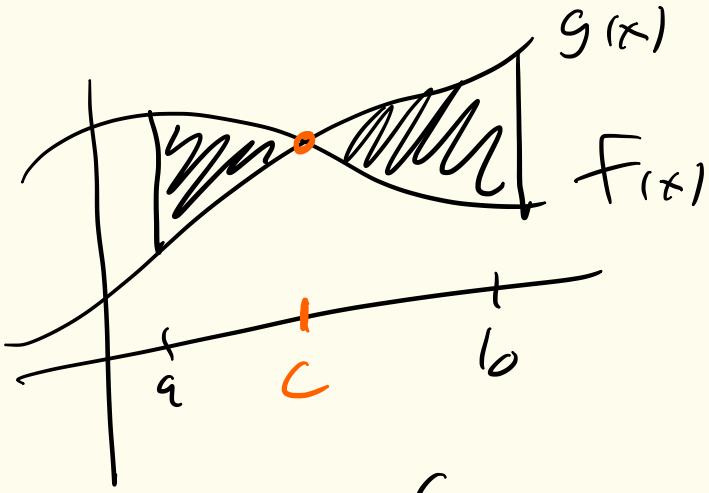
$$\text{Area} = -\int_a^b g(x)\,dx > 0$$



 = Area + Area

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

 −  = 



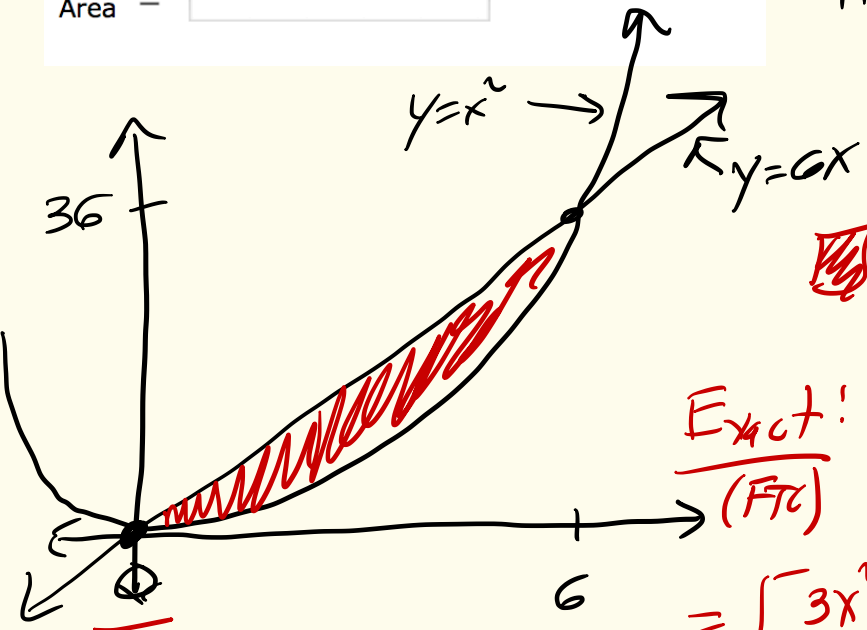
$$\text{area} = \int_a^c f(x) - g(x)\,dx + \int_c^b g(x) - f(x)\,dx$$

Chapter 5, Section 5.3, Question 4

Find the area enclosed by $y = 6x$ and $y = x^2$.

Round your answer to one decimal place.

Area =



$6x = x^2$ or (x, y)

$x^2 - 6x = 0 \Rightarrow x = 0$ or $x = 6$

$x(x-6) = 0$

6 polynomial

$$\text{Area} = \int_0^6 (6x - x^2)\,dx = 36$$

Exact! (FTC)

$$\left[\frac{6x^2}{2} - \frac{x^3}{3}\right]\Bigg|_{x=0}^{x=6}$$

$$= \left[3x^2 - \frac{1}{3}x^3\right]\Bigg|_0^6 = \left(3 \cdot 6^2 - \frac{1}{3} \cdot 6^3\right) - (0)$$

$$= 36$$

Chapter 5, Section 5.3, Question 22

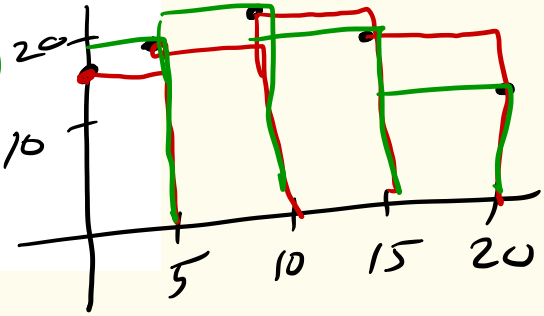
Use the following table to estimate the area between $f(x)$ and the x-axis on the interval $0 \le x \le 20$.

x	0	5	10	15	20
$f(x)$	16	19	21	17	13

Round your answer to one decimal place.

Area $\approx$ 357.5 .

SUBMIT



$LHS = 5 \cdot (16+19+21+17)$

$= 5(73) = 365$

$RHS = 5 \cdot (19+21+17+13)$

$= 5 \cdot (70) = 350$

$\text{Area} \approx \dfrac{365+350}{2}$

$= 357\frac{1}{2}$

Chapter 5, Section 5.4, Question 9

After a foreign substance is introduced into the blood, the rate at which antibodies are made is given by

$$r(t) = \frac{t}{t^2 + 1} \text{ thousands of antibodies per minute,}$$

where time, t, is in minutes.

Assuming there are no antibodies present at time $t = 0$, find the total quantity of antibodies in the blood at the end of 3 minutes.

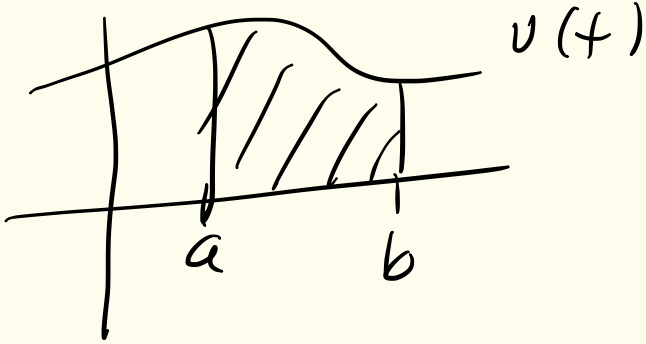
Round your answer to three decimal places.

Total Quatity of Antibodies = 1.151 thousand antibodies

$$\int_0^3 r(t)\,dt = \int_0^3 \frac{t}{t^2+1}\,dt \approx 1.15129$$

$$\int \frac{t}{t^2+1}\,dt = \frac{1}{2}\ln(t^2+1) + C$$

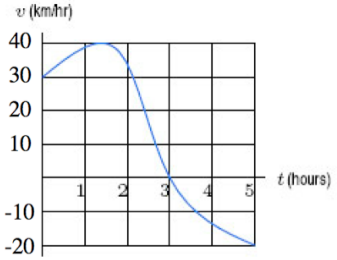
LATER!



total displacement between $t=a$ and $t=b$ $= \int_a^b v(t)\,dt$

$= \underbrace{s(b)}_{\text{where you are at } t=b} - \underbrace{s(a)}_{\text{where you were at time } t=a}$

Chapter 5, Section 5.4, Question 33



The figure above gives your velocity during a trip starting from home. Positive velocities take you away from home and negative velocities take you toward home.

Round your answers to the nearest integers.

Where are you at the end of the 5 hours?

Distance from home is _____ km.

When are you farthest from home?

_____ hours.