Deb's: 5.1, 5.5

Now: 5.2-5.4

5.2 ... Recall

$$3^x = e^{\ln(3^x)} = e^{x\ln 3} = e^{(\ln 3)x}$$

e is the base $\ni$ $\lim_{h\to 0} \frac{e^h - 1}{h} = 1$

e^x is the function whose height = its slope.

$$\frac{d}{dx}\left[3^x\right] = \frac{d}{dx}\left[e^{(\ln 3)x}\right] = (\ln 3)e^{(\ln 3)x} = (\ln 3)(3^x)$$

$$\frac{d}{dx}\left[e^x\right] = e^x$$

Chain rule

$$\frac{d}{dx}\left[e^{f(x)}\right] = f'(x)e^{f(x)}$$

$$\frac{d}{dx}\left[g(f(x))\right] = \frac{dg}{df}\cdot\frac{df}{dx}$$

$$\frac{d}{dx}\left[(\ln 3)x\right] = \ln 3$$

§ 5.2 $f(x)$

Disc : VOLUME

$= \pi r^2 h$, where r = radius

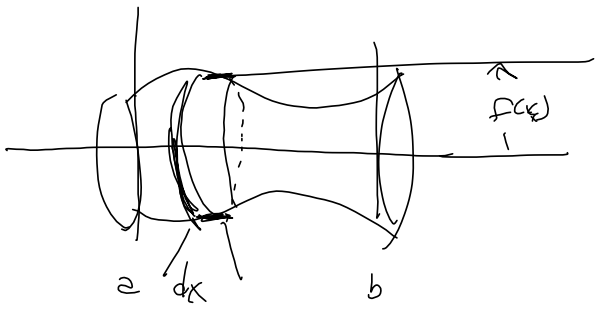
& $h = \Delta x = dx$. & $r = f(x)$!

Add up a bunch of these:

$$\sum_{k=1}^{n} \pi r^2 h = \pi \sum_{k=1}^{n} f(x)^2 \Delta x$$

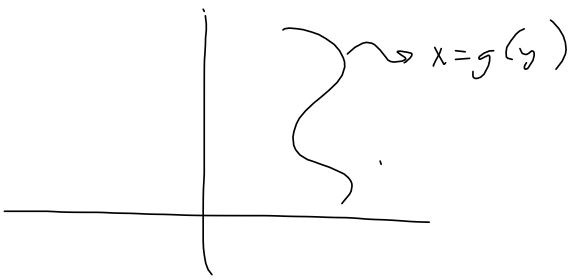
$n \to \infty$

$$\boxed{\pi \int_a^b f(x)^2 dx = \text{VOLUME}}$$



And about the y-axis

$$V = \pi \int_c^d g(y)^2 dy$$



§5.2 Graphing skills from MAT 121

$g(x) = 3 \cdot 2^{5x-10} - 11$ $\quad 5x-10 = 5(x-2)$

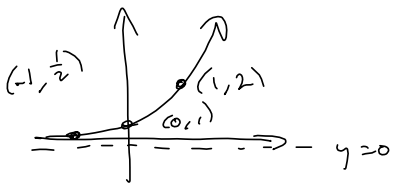
$f(x) = 2^x \longmapsto 3 \cdot 2^x \longmapsto 3 \cdot 2^{5x} \longmapsto 3 \cdot 2^{5(x-2)}$

$y \mapsto 3y \qquad x \mapsto \frac{1}{5}x \qquad x \mapsto x+2$

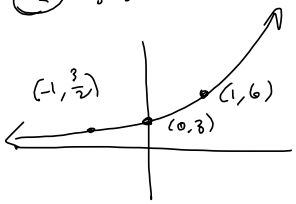
$\longmapsto 3 \cdot 2^{5(x-2)} - 11$

$y \mapsto y - 11$

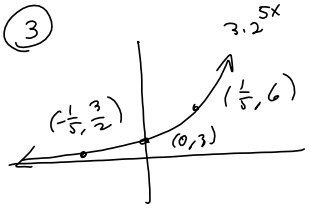
(1) 2^x



(2) $3 \cdot 2^x$



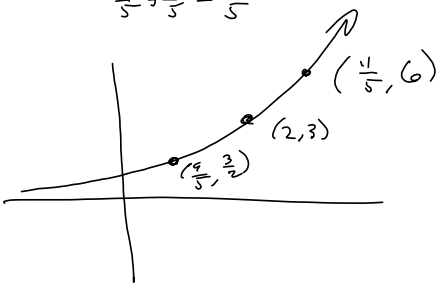
(3) $3 \cdot 2^{5x}$



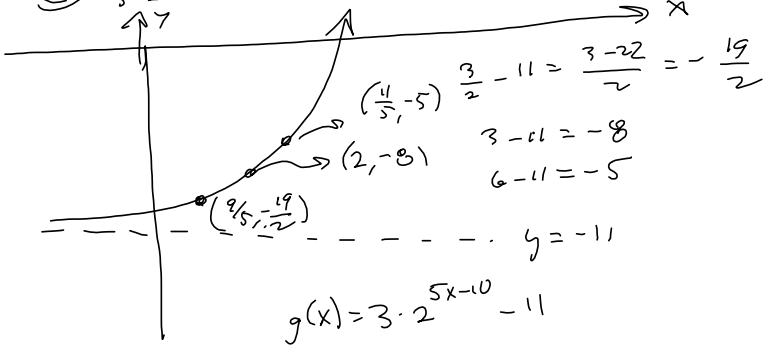
(4) $3 \cdot 2^{5(x-2)}$

$-\frac{1}{5} + \frac{10}{5} = \frac{9}{5}$

$\frac{1}{5} + \frac{10}{5} = \frac{11}{5}$



(5) $3 \cdot 2^{5(x-2)} - 11$



$\frac{3}{2} - 11 = \frac{3-22}{2} = -\frac{19}{2}$

$3 - 11 = -8$

$6 - 11 = -5$

$g(x) = 3 \cdot 2^{5x-10} - 11$

$$\frac{d}{dx}\left[\frac{e^x}{1-e^x}\right] = \frac{e^x(1-e^x) - e^x(-e^x)}{(e^x-1)^2}$$

$$= \frac{e^x - e^{2x} + e^{2x}}{(e^x-1)^2} = \frac{e^x}{(e^x-1)^2}$$

$$(1-e^x)^2 = (e^x-1)^2$$

$$e^x e^x = e^{x+1} = e^{2x}$$

Next time

(A) §6.3 Shell Method

(B) C5 : Derivative of the inverse

$$\frac{d}{dx}[\ln(x)] = \frac{1}{x}$$

MAT 202 NAME

write out the context of the question.

MAKE YOUR WORK STAND ON ITS OWN.

what's being asked

Clear Answer.

Melanie 'takin' charge.

202 5.5.2

#51-8 Find the volume V of the solid of revolution obtained by rotating the given curve about the given line.

(1)