6. **(1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.15.pg**

Book Problem 15

Consider the region enclosed by the graphs of $2y = 3\sqrt{x}, y = 8$, and $2y + 1x = 4$.

The area A of this region could be computed in two ways:

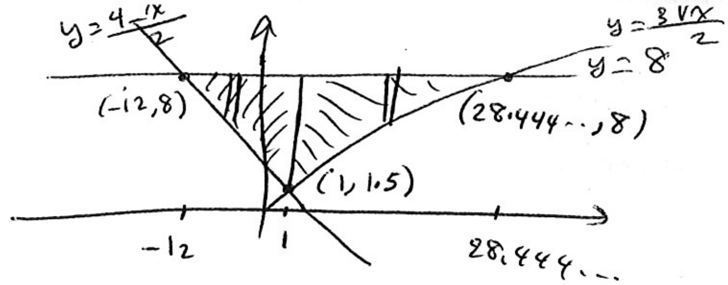
1) By integrating with respect to x, A $= \int_a^b h_1(x)\,dx + \int_b^c h_2(x)\,dx$

where $a = \underline{-12}$, $b = \underline{1}$, $c = \underline{28.4444\ldots}$
$h_1(x) = \underline{\quad}$, and $h_2(x) = \underline{\cancel{8-} \; 8 - \frac{3\sqrt{x}}{2}}$
$= 8 - \frac{4-x}{2}$
The area A = ________.

2) By integrating with respect to y, A = $\int_d^e h_3(y)\,dy$

where $d = \underline{1.5}$, $e = \underline{8}$, and $h_3(y) = \frac{4y^2}{9} - 4 + 2y$

The area A = ________.



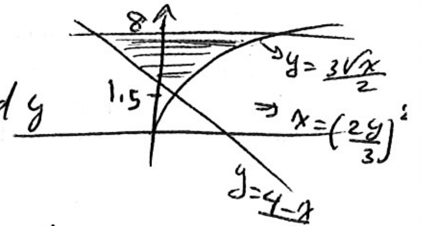
1) $A = \int_{-12}^{1} \left(8 - \left(\frac{4-x}{2}\right)\right) dx + \int_{1}^{28.444\ldots} \left(8 - \frac{3\sqrt{x}}{2}\right) dx$

$= \int_{-12}^{1} \left(6 + \frac{x}{2}\right) dx + \ldots$

$= \left(6x + \frac{x^2}{4}\right)\Big|_{-12}^{1} + \left(8x - \frac{3}{2}\cdot\frac{2}{3}x^{3/2}\right)\Big|_{1}^{28.444\ldots}$

$= \ldots$

2) $A = \int_{1.5}^{8} (x_{right} - x_{left})\,dy$



$= \int_{1.5}^{8} \left(\frac{4y^2}{9} - (4-2y)\right) dy = \frac{4y^3}{27} - 4y + y^2 \Big|_{1.5}^{8} \ldots$

7. **(1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.16.pg**

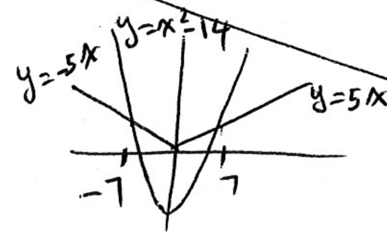
Book Problem 16

Sketch the region enclosed by the curves $y = 5|x|$ and $y = x^2 - 14$.

List the points of intersection of these curves from LEFT to RIGHT in the form (x, y) :
($\underline{-7}$, $\underline{35}$) and ($\underline{7}$, $\underline{35}$).

Due to the symmetry of the region with respect to the y-axis, the area
$A = 2\int_0^a h(x)dx$ where $a = \underline{7}$ and $h(x) = \underline{5x - (x^2 - 14)}$

After integrating, the area $A =$ ________.



$A = \int_0^7 (Y_{top} - Y_{bottom})\,dx = \int_0^7 (5x - x^2 + 14)$

$= \frac{5x^2}{2} - \frac{x^3}{3} + 14x \Big|_0^7 = \ldots$

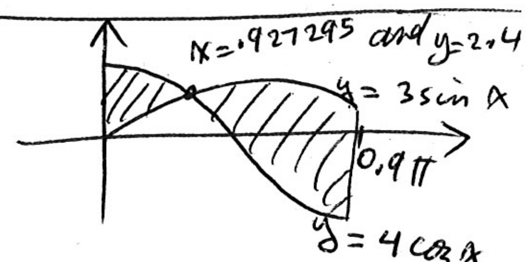
8. **(1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.21.pg**

Book Problem 21

Sketch the region that lies between the curves $y = 3\sin(x)$ and $y = 4\cos(x)$ from $x = 0$ to $x = 0.9\pi$. Notice that this region consists of two separate parts.

Using a graphing calculator, the x-coordinate c of the point of intersection is approximately equal to $\underline{.927295}$

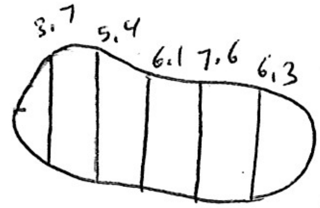
The area A of this region is $= \int_0^c$ ____ $dx + \int_c^{0.9\pi}$ ____ dx
After integrating, $A =$ ____.



$A = \int_0^{.927295} (4\cos x - 3\sin x)\,dx$

$+ \int_{.927295}^{.9\pi} (3\sin x - 4\cos x)\,dx$

9. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.25.pg



Book Problem 25

The widths (in meters) of a kidney-shaped swimming pool, measured at 2-meter intervals, are:

0, 3.7, 5.4, 6.1, 7.6, 6.3, and 0.

Use Simpson's Rule to estimate the area of the pool. ____________

width

$\text{Area} = \int [f(x) - g(x)]\,dx$

$= \frac{\Delta x}{3}\left[0 + 4(3.7) + 2(5.4) + 4(6.1) + 2(7.6) + 4(6.3) + 0\right]$

$= \frac{2}{3}(14.8 + 10.8 + 24.4 + 15.2 + 25.2)$

$= \boxed{\ldots}$

10. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.27.pg

Book Problem 27

If the birth rate of a population is $b(t) = 3000e^{0.029t}$ people per year and the death rate is $d(t) = 1530e^{0.013t}$ people per year, then the increase in population over a 5-year period is equal to the area between these curves for $0 \le t \le 5$.

Thus, the increase in population during that period is equal to $\int_0^5$ ____________ $dt =$ _____.

$\int_0^5 \left(3000e^{0.029t} - 1530e^{0.013t}\right)dt$ integrate

$= \frac{3000}{0.029}\left(e^{0.029*5} - e^{0}\right) - \frac{1530}{0.013}\left(e^{0.013*5} - e^{0}\right)$

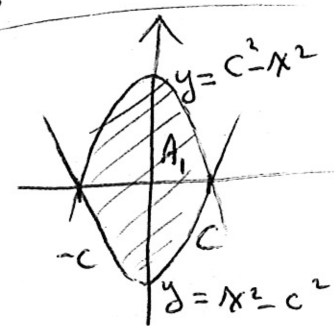
$= \ldots$

11. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.31.pg

Book Problem 31

Find the value of $c > 0$ such that the area of the region enclosed by the parabolas $y = x^2 - c^2$ and $y = c^2 - x^2$ is 140.

$c =$ ____________



Area of the whole region

$= 4A_1 = 4\int_0^c (Y_{top} - Y_{bottom})\,dx$

$= 4\int_0^c (c^2 - x^2 - 0)\,dx = 4\left(c^2x - \frac{x^3}{3}\right)\Big|_0^c = 4\left(c^3 - \frac{c^3}{3}\right)$

$= \frac{8}{3}c^3 = 140 \Rightarrow c^3 = \frac{3(140)}{8} \Rightarrow c = \sqrt[3]{\ldots}$

12. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec7.1.33.pg

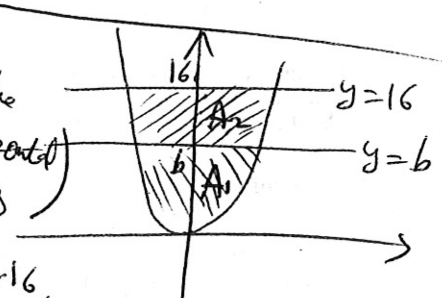
Book Problem 33

Find the number b such that the line $y = b$ divides the region bounded by the curves $y = x^2$ and $y = 16$ into two regions with equal area.

$x = \sqrt{y}$

$b =$ ____________

to simplify the work consider the areas to the right only (do Horizontal slicing)



$A_1 = A_2$

$A_1 = \int_0^b (x_{right} - x_{left})\,dy = \int_b^{16} (x_{right} - x_{left})\,dy = A_2$

$\int_0^b (\sqrt{y} - 0)\,dy = \int_b^{16} (\sqrt{y} - 0)\,dy$

$\Rightarrow \frac{2}{3} y^{3/2}\Big|_0^b = \frac{2}{3} y^{3/2}\Big|_b^{16}$

$\Rightarrow \cancel{\frac{2}{3}} b^{3/2} = \cancel{\frac{2}{3}}\left(16^{3/2} - b^{3/2}\right) = \frac{2}{3}\left(64 - b^{3/2}\right)$

$\Rightarrow b^{3/2} = 64 - b^{3/2} \Rightarrow 2b^{3/2} = 64 \Rightarrow b^{3/2} = 32 \Rightarrow b = (32)^{2/3}$