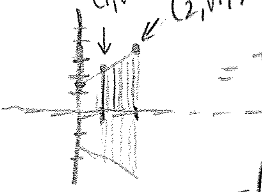
CALCULUS AB WS CH.7 Name Key #4/4 Per.

1) Let R be the enclosed region between the graph of f and the x-axis on the given interval.

$f(x)=\sqrt{2x^2+3}$; $[1,2]$ **(Show work)**

a) Find the volume V of the solid obtained by revolving R about the x-axis.

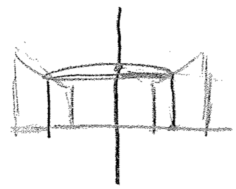
$(1,\sqrt{5})$ $(2,\sqrt{11})$



$= \pi \int_1^2 \left(\sqrt{2x^2+3}\right)^2 dx$

$= \boxed{24.06}\, u^3$

b) Find the volume V of the solid generated by revolving R about the y-axis.

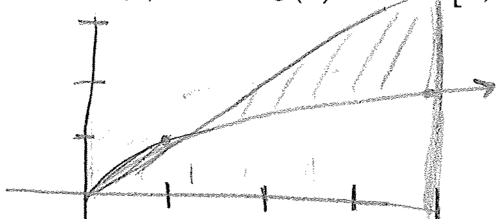


$= 2\pi \int_1^2 \left(x\left(\sqrt{2x^2+3}\right)\right) dx$

$= \boxed{26.50}\, u^3$

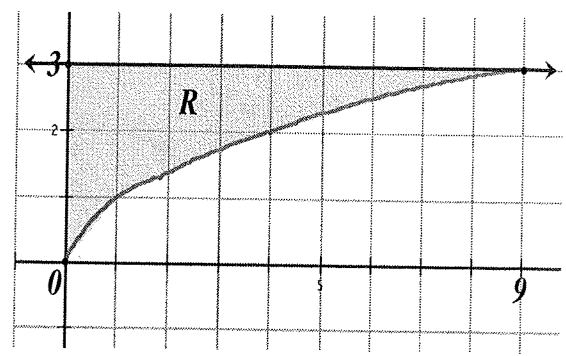
2) Find the area between graphs on interval. **(Show work)**

$f(x)=x \qquad g(x)=\sqrt{x} \qquad [0,4]$



$= \int_0^1 (\sqrt{x}-x)\,dx + \int_1^4 (x-\sqrt{x})\,dx$

$= .1\overline{6} + 2.8\overline{3} = \boxed{2.\overline{9}}$



3) Given the region R between the graph of $f(x)=\sqrt{x}$ and $g(x)=3$. **(Set up and use your calculator)**

a) Find Area using vertical cross sections

$y=\sqrt{x}$

$y^2=x$

$A = \int_0^9 (3-\sqrt{x})\,dx$

$\boxed{A = 9u^2}$

b) Find Area using horizontal cross sections

$A = \int_0^3 y^2\,dy$

$\boxed{A = 9u^2}$

Find the volume of the solid whose base is the region between *f(x)* and $g(x)$ and whose cross sections cut by planes perpendicular to the x-axis are:

$3-\sqrt{x}$ $\quad \left(\frac{3-\sqrt{x}}{2}\right)\sqrt{3}$

c) squares

$V = \int_0^9 (3-\sqrt{x})^2\,dx$

$= \boxed{13.5u^3}$

d) rectangle (height=$10 \cdot$ base)

$V = \int_0^9 ((3-\sqrt{x})(10)(3-\sqrt{x}))\,dx$

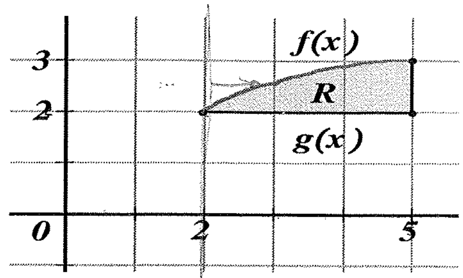
$= \boxed{135u^3}$

e) equilateral triangles

$A = \int_0^9 \frac{1}{2}(3-\sqrt{x})\left(\frac{\sqrt{3}(3-\sqrt{x})}{2}\right)dx$

$= \boxed{5.85u^3}$

4) Set up the following volumes for the shaded region to the right. **(Set up only)**



a) volume about x-axis

$$V=\pi\int_2^5\left((f(x))^2-(g(x))^2\right)dx$$

b) volume about y-axis

$$V=2\pi\int_2^5 x\,(f(x)-g(x))\,dx$$

c) vol. about line $x=8$

$$2\pi\int_2^5(8-x)(f(x)-g(x))\,dx$$

d) vol. about line $y=-5$

$$V=\pi\int_2^5 (f(x)+5)^2-(g(x)+5)^2\,dx$$

e) vol. about line $x=-3$

$$V=2\pi\int_2^5(x+3)(f(x)-g(x))\,dx$$

f) vol. about line $y=8$

$$V=\pi\int_2^5\left((8-(g(x))^2-(8-f(x))^2\right)dx$$

g) vol. about line $y=1$

$$V=\pi\int_2^5\left((f(x)-1)^2-(g(x)-1)^2\right)dx$$

h) vol. about line $x=2$

$$V=2\pi\int_2^5(x-2)(f(x)-g(x))\,dx$$

Find the volume of the solid whose base is the shaded region and whose cross sections cut by planes perpendicular to the ~~y~~ x- axis are: $A=\frac{1}{2}b\cdot h$ $A=\frac{1}{2}\pi r^2$

i) squares

$$\int_2^5(f(x)-g(x))^2\,dx$$

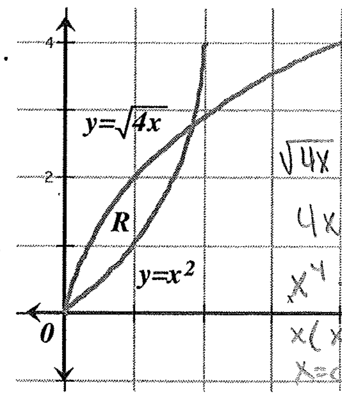
j) equilateral triangles

$$\frac{1}{2}\int_2^5(f(x)-g(x))\left(\frac{\sqrt{3}(f(x)-g(x))}{2}\right)dx$$

k) semicircles

$$\frac{\pi}{2}\int_2^5\left(\frac{f(x)-g(x)}{2}\right)^2dx$$

5) Let R be the enclosed region between the graph of $f(x)=\sqrt{4x}$ and $g(x)=x^2$. **(Set up and use calculator)**



$\sqrt{4x}=x^2$
$4x=x^4$
$x^4-4x=0$
$x(x^3-4)=0$
$\cancel{x=0}$ $x^3=4$
$x=\sqrt[3]{4}$

a) Find the volume V of the solid obtained by revolving R about the line $y=-7$.

$$V=\pi\int_0^{\sqrt[3]{4}}\left((\sqrt{4x}+7)^2-(x^2+7)^2\right)dx=\boxed{68.14}$$

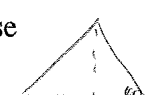
b) Find the volume V of the solid obtained by revolving R about the line $x=10$.

$$V=2\pi\int_0^{\sqrt[3]{4}}(10-x)(\sqrt{4x}-x^2)\,dx=\boxed{77.79}$$

c) Find the volume V of the solid obtained by revolving R about the line $y=20$.

$$V=\pi\int_0^{\sqrt[3]{4}}(20-x^2)^2-(20-\sqrt{4x})^2\,dx=\boxed{158.05}$$

Find the volume V of the solid whose base is the region between $f(x)$ and the $g(x)$ and whose cross sections cut by planes perpendicular to the x-axis are: $A=\frac{1}{2}bh$



$\frac{\sqrt{4x}-x^2}{2}$

d) semicircles $A=\frac{\pi r^2}{2}=\frac{1}{2}\pi\left(\frac{\sqrt{4x}-x^2}{2}\right)^2$

$$\frac{\pi}{2}\int_0^{\sqrt[3]{4}}\left(\frac{\sqrt{4x}-x^2}{2}\right)^2dx=\boxed{.509}$$

e) equilateral triangles

$$\frac{1}{2}\int_0^{\sqrt[3]{4}}(\sqrt{4x}-x^2)\left(\frac{(\sqrt{4x}-x^2)\sqrt{3}}{2}\right)dx=\boxed{.561}$$