(6.2) HW: Part I: p.423 #1-6: all
#11a, #12b
#31-34

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#1)

$$V=\pi\int_0^1(-x+1)^2\,dx$$

$$=\pi\int_0^1(x^2-2x+1)\,dx$$

$$=\pi\left[\frac{x^3}{3}-x^2+x\right]_0^1=\frac{\pi}{3}$$

#2)

$$V=\pi\int_0^2(4-x^2)^2\,dx$$

$$=\pi\int_0^2(x^4-8x^2+16)\,dx$$

$$=\pi\left[\frac{x^5}{5}-\frac{8x^3}{3}+16x\right]_0^2=\frac{256\pi}{15}$$

#3)

$$V=\pi\int_1^4(\sqrt{x})^2\,dx$$

$$=\pi\int_1^4 x\,dx=\pi\left[\frac{x^2}{2}\right]_1^4$$

$$=\frac{15\pi}{2}$$

#4)

$$V=\pi\int_0^2(\sqrt{4-x^2})^2\,dx$$

$$=\pi\int_0^2(4-x^2)\,dx=\pi\left[4x-\frac{x^3}{3}\right]_0^2$$

$$=\frac{16\pi}{3}$$

#5)

$$V=\pi\int_0^1[(x^2)^2-(x^3)^2]\,dx$$

$$=\pi\int_0^1(x^4-x^6)\,dx$$

$$=\pi\left[\frac{x^5}{5}-\frac{x^7}{7}\right]_0^1=\frac{2\pi}{35}$$

#6) We need to find the boundaries (points of intersection)

$$2=4-x^2/4$$

$$8=16-x^2$$

$$x=\pm2\sqrt{2}$$

$$V=\pi\int_{-2\sqrt{2}}^{2\sqrt{2}}\left[\left(4-\frac{x^2}{4}\right)^2-(2)^2\right]dx$$

$$=2\pi\int_{-2\sqrt{2}}^{2\sqrt{2}}\left[\frac{x^4}{16}-2x^2+12\right]dx$$

$$=\frac{448\sqrt{2}}{15}\pi\approx 132.69$$

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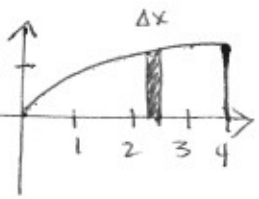
#11a) $y=\sqrt{x}$, $y=0$, $x=4$

(a) $R(x)=\sqrt{x}$, $r(x)=0$

Disc method



$V=\pi\int[R(x)]\,dx$

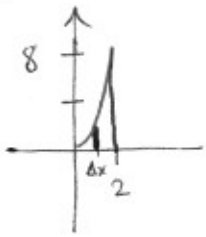
$=\pi\int_0^4(\sqrt{x})^2\,dx$

$=\pi\int_0^4 x\,dx=\left[\frac{\pi}{2}x^2\right]_0^4$

$=8\pi$

#12b) $y=2x^2$ $y=0$, $x=2$

(b) $R(x)=2x^2$

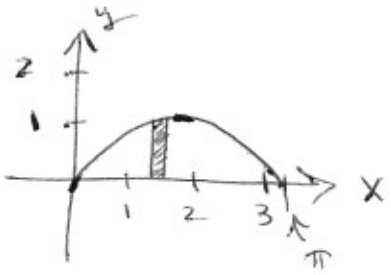


$V=\pi\int_0^2[(2x)^2]\,dx$

$=\pi\int_0^2 4x^2\,dx=\pi\left[\frac{4x^5}{5}\right]_0^2$

$=\frac{128\pi}{5}$

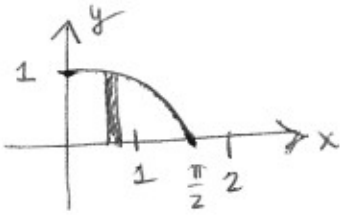
#31) $y=\sin x$ $y=0$, $x=0$, $x=\pi$



$V=\pi\int_0^{\pi}[\sin x]^2\,dx$

≈ 4.9348

#32) $y=\cos x$ $y=0$, $x=0$, $x=\frac{\pi}{2}$



$V=\pi\int_0^{\pi/2}[\cos x]^2\,dx$

≈ 2.4674

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#33

$y = e^{-x^2}$ $y=0$, $x=0$, $x=2$

$$V = \pi \int_0^2 \left[e^{-x^2}\right]^2 dx$$

$$\approx 1.9686$$

#34

$y = \ln x$ $y=0$, $x=1$, $x=3$

$$V = \pi \int_1^3 \left[\ln x\right]^2 dx$$

$$\approx 3.2332$$