1) $v(t) = \frac{8}{\pi} \sin \frac{4t}{\pi}$, $s(\pi^2) = 2$

$s(t) = \frac{\pi}{4}\left(-\frac{8}{\pi} \cos \frac{4t}{\pi}\right) + C$

$s(t) = -2\cos 4t/\pi + C$

$2 = -2\cos 4\pi + C$

$2 = -2 + C$

$4 = C$

$s(t) = -2\cos {}^{4t}/\pi + 4$

2.) $a(t) = 20 \quad v(0) = 3 \quad s(0) = 6$

$v(t) = 20t + C$

$3 = 20(0) + C$

$3 = C$

$v(t) = 20t + 3$

$s(t) = 10t^2 + 3t + C$

$6 = 10(0)^2 + 3(0) + C$

$6 = C$

$s(t) = 10t^2 + 3t + 6$

3.) $a(t) = 10\cos 2t$; $v(0) = -3$ $s(0) = 12$

$v(t) = 10/5 \sin 2t + C$

$-3 = 5\sin 0 + C$

$-3 = C$

$v(t) = 5\sin 2t - 3$

$s(t) = 5/2(-\cos 2t) - 3t + C$

$s(t) = -5/2 \cos 2t - 3t + C$

$12 = -5/2(\cos 0) - 3(0) + C$

$12 = -5/2 + C$

$29/2 = C$

$s(t) = -5/2 \cos 2t - 3t + 29/2$

4.) $\int_{-4}^{0} (x^3+x^2-6x) - (6x)\,dx + \int_{0}^{3} (6x) - (x^3+x^2-6x)\,dx$

$\int_{-4}^{0} x^3 + x^2 - 12x\,dx + \int_{0}^{3} -x^3 - x^2 + 12x\,dx$

$= \left(\frac{x^4}{4} + \frac{x^3}{3} - 6x^2 \Big|_{-4}^{0}\right) + \left(-\frac{x^4}{4} - \frac{x^3}{3} + 6x \Big|_{0}^{3}\right)$

$= (0) - \left(\frac{(-4)^4}{4} + \frac{(-4)^3}{3} - 6(-4)^2\right) + \left(-\frac{3^4}{4} - \frac{3^3}{3} + 6(3) - 0\right)$

$= \frac{937}{12}$

5.) $\int_{0}^{8} \sqrt{2x} - (x-4)\,dx$

$x - 4 = \sqrt{2x}$

$x^2 - 8x + 16 = 2x$

$x^2 - 10x + 16 = 0$

$(\cancel{x-2})(x-8) = 0$

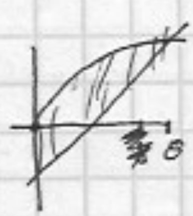
- case

$\int_{0}^{8} (2x)^{1/2} - x + 4\,dx$

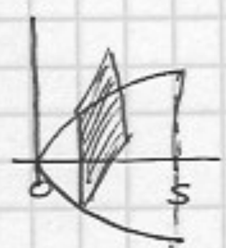
$= \cancel{\frac{2(2x)^{3/2}}{3 \cdot 2}} - \frac{x^2}{2} + 4x \Big|_{0}^{8}$

$= \left(\frac{64}{3} - \frac{64}{2} + 32\right) - (0)$

$= \frac{64}{3}$



6.)



$A = s^2$

$s = (4\sqrt{x} - (-4\sqrt{x}))$

$s = 8\sqrt{x}$

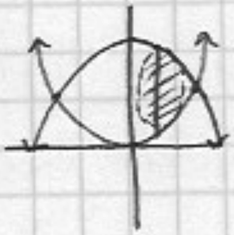
$\int_{0}^{5} (8\sqrt{x})^2\,dx = \int_{0}^{5} 64x\,dx$

$32x^2 \Big|_{0}^{5}$

$32(25) - 32(0)$

$= 800$

7.)



$x^2 = 50 - x^2$
$2x^2 - 50 = 0$
$2(x^2 - 25) = 0$
$x = \pm 5$
use symmetry!

$A = \pi r^2 \qquad r = \frac{(50-x^2)-(x^2)}{2}$

$$2\int_0^5 \pi\left(\frac{(50-x^2)-(x^2)}{2}\right)^2 dx$$

(w/calculator)

$$2\pi\left(\frac{5000}{3}\right)$$

$$= \frac{10000}{3}\pi$$

8.)

1 radius

$r = 16 - x^2$

$$\pi\int_0^4 (16-x^2)^2 dx$$

$$\pi\int_0^4 (256 - 32x^2 + x^4)\,dx$$

$$\pi\left(256x - \frac{32x^3}{3} + \frac{x^5}{5}\Big|_0^4\right)$$

$$\pi\left(\left(256(4) - \frac{32(4)^3}{3} + \frac{(4)^5}{5}\right) - (0)\right)$$

$$\pi\left(\frac{8192}{15}\right) = \frac{8192}{15}\pi$$

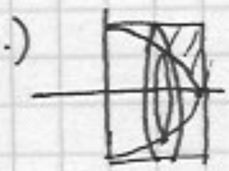
9.)

$A = \pi r^2$
1 radius $\quad y = \sqrt{5x}$
$\frac{1}{5}y^2 = x$

$$\pi\int_0^5 \left(\frac{1}{5}y^2\right)^2 dy = \pi\int_0^5 \frac{y^4}{25}\,dy$$

$$= \pi\left(\frac{y^5}{125}\Big|_0^5\right) = \pi\left(\frac{5^5}{5^3}\right) = 25\pi$$

10.)



2 radii
Big R: 16
Littler: $16 - x^2$

$$\pi\int_0^4 (16)^2 - (16-x^2)^2 dx$$

$$\pi\int_0^4 \cancel{16^2} - \cancel{16^2} + 32x^2 - x^4\,dx$$

$$\pi\left[\frac{32}{3}x^3 - \frac{x^5}{5}\Big|_0^4\right]$$

$$\pi\,[\text{illegible}] = \frac{7168\pi}{15}$$

11.)

2 Radii
Big R: 4
Littler: $\frac{y^2}{4}$

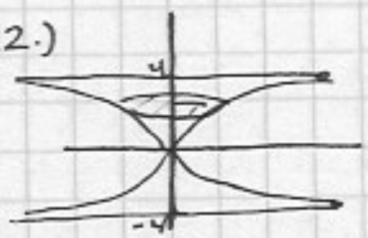
$$\pi\int_0^4 (4)^2 - \left(\frac{y^2}{4}\right)^2 dy$$

$$\pi\int_0^4 16 - y^4/16\,dy$$

$$\pi\left[16y - y^5/80\Big|_0^4\right]$$

$$= \frac{256}{5}\pi$$

12.)

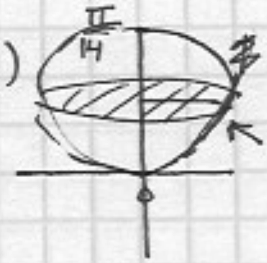


1 radius
(use symmetry)
$x = \frac{y^2}{4}$

$$2\pi\int_0^4 \left(\frac{y^2}{4}\right)^2 dy = 2\pi\int_0^4 \frac{y^4}{16}\,dy$$

$$2\pi\left(\frac{y^5}{80}\Big|_0^4\right) = 2\pi\left(\frac{4\cdot4\cdot4\cdot4\cdot4}{4\cdot4\cdot5}\right)$$

$$2\pi\left(\frac{64}{5}\right) = \frac{128\pi}{5}$$

13.) 

1 Radius

$R = \sqrt{\sin 7y}$

$$\pi \int_0^{\pi/14} (\sqrt{\sin 7y})^2 dy = \pi \int_0^{\pi/14} \sin 7y \, dy$$

$$= \pi \left[\frac{-\cos 7y}{7} \Big|_0^{\pi/14} \right]$$

$$= -\frac{\pi}{7} \left[\cos 7y \Big|_0^{\pi/14} \right]$$

$$= -\frac{\pi}{7} \left[\cos \pi/2 - \cos 0 \right]$$

$$= -\frac{\pi}{7} [0 - 1]$$

$$\boxed{= \frac{\pi}{7}}$$