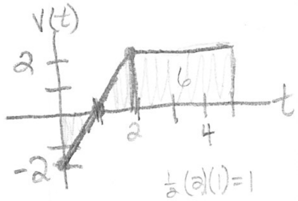
Review 7.1 to 7.3

1. $V(t) = 15t^4 - 12t^2$

$$\int_0^3 (15t^4 - 12t^2)\,dt$$

$$3t^5 - 4t^3 \Big|_0^3$$

$$3\cdot 3^5 - 4\cdot 3^3 = 621 \rightarrow \boxed{620\text{m}}$$

2. 

initial position

$$2 + -1 + 1 + 6 = \boxed{8}$$

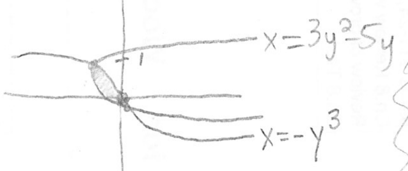
3. $\overset{\text{Force}}{F} = K\cdot \overset{\text{distance}}{x}$

$12 = K\cdot 5$

$K = \frac{12}{5} = 2.4$

$W = \int F$

$$W = \int_0^8 2.4x\,dx = 1.2x^2\Big|_0^8 = \boxed{76.8\ \text{N}\cdot\text{cm}}$$

4. 

$$\int_0^1 \left(-y^3 - (3y^2 - 5y)\right)dy$$

$$\int_0^1 (-y^3 - 3y^2 + 5y)\,dy$$

$$-\frac{y^4}{4} - y^3 + \frac{5y^2}{2}\Big|_0^1 = -\frac{1}{4} - 1 + \frac{5}{2} = \boxed{\frac{5}{4}}$$

$-\frac{5}{4} + \frac{10}{4}$

$x = -y^3$

$-x = y^3$

$(-x)^{1/3} = y$

$x = 3y^2 - 5y$

$$\frac{25}{36} + \frac{x}{3} = y^2 - \frac{5}{3}y + \frac{25}{36}$$

$$\frac{25}{36} + \frac{12x}{36} = \left(y - \frac{5}{6}\right)^2$$

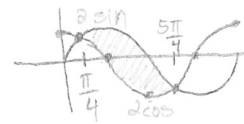
$$\frac{1}{36}(12x+25) = \left(y - \frac{5}{6}\right)^2$$

$$\pm\sqrt{\frac{1}{36}(12x+25)} = y - \frac{5}{6}$$

$$\pm\frac{1}{6}\sqrt{12x+25} + \frac{5}{6} = y$$

5. $y = 2\sin x$

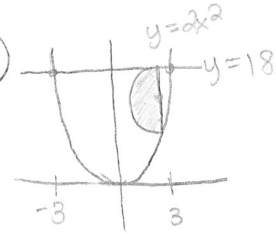
$y = 2\cos x$



$$\int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} (2\sin x - 2\cos x)\,dx$$

$$2\left[-\cos x - \sin x\right]_{\pi/4}^{5\pi/4} = 2\left[\left(-\left(-\frac{\sqrt2}{2}\right) - \left(-\frac{\sqrt2}{2}\right)\right) - \left(-\left(\frac{\sqrt2}{2}\right) - \left(\frac{\sqrt2}{2}\right)\right)\right]$$

$$= 2\left[\sqrt2 + \sqrt2\right] = 2(2\sqrt2) = \boxed{4\sqrt2}$$

6. 

$d = 18 - 2x^2$

$r = 9 - x^2$

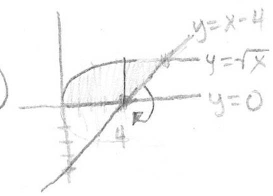
(semi) $A = \frac{1}{2}\pi(9-x^2)^2$

$$= \frac{1}{2}\pi\int_{-3}^{3}(81 - 18x^2 + x^4)\,dx$$

$$= \pi\int_0^3 (81 - 18x^2 + x^4)\,dx$$

$$= \pi\left[81x - 6x^3 + \frac{1}{5}x^5\right]_0^3$$

$$= \pi\left(243 - 162 + \frac{243}{5}\right) = \boxed{\frac{648\pi}{5}}$$

7. 

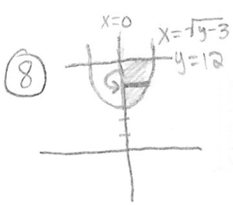
$$\pi\int_0^4 (\sqrt{x})^2\,dx + \pi\int_4^{\frac{9+\sqrt{17}}{2}}\left[(\sqrt{x})^2 - (x-4)^2\right]dx$$

$$\pi\left[\int_0^4 x\,dx + \int_4^{\frac{9+\sqrt{17}}{2}}\left(x - (x^2 - 8x + 16)\right)dx\right]$$

$$\pi\left[\frac{x^2}{2}\Big|_0^4 + \int_4^{\frac{9+\sqrt{17}}{2}}(-x^2 + 9x - 16)\,dx\right]$$

$$\pi\left[8 + \left(-\frac{x^3}{3} + \frac{9}{2}x^2 - 16x\right)_4^{\frac{9+\sqrt{17}}{2}}\right]$$

$$\pi\left[8 + (-5.408934 - (-13.333333))\right] = \pi(8 + 7.9243996) = \boxed{15.924\pi} \ \underline{50.028}$$

8. 

$r = \sqrt{y-3}$

$$\pi\int_3^{12}\left(\sqrt{y-3}\right)^2 dy$$

$$\pi\int_3^{12}(y-3)\,dy$$

$$\pi\left[\frac{y^2}{2} - 3y\right]_3^{12}$$

$$\pi\left[(72-36) - \left(\frac{9}{2} - 9\right)\right]$$

$36 + \frac{9}{2}$

$$= \boxed{\frac{81\pi}{2}}$$

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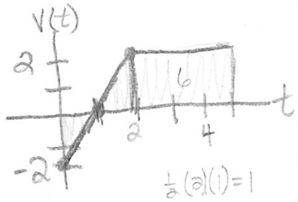
2. 

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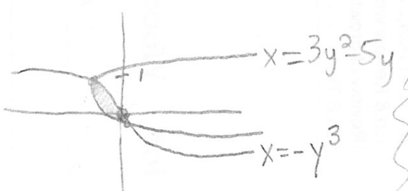
4. 

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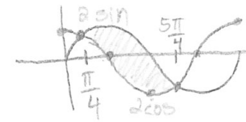

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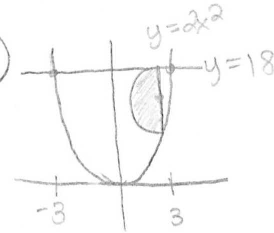
6. 

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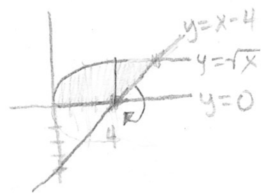
7. 

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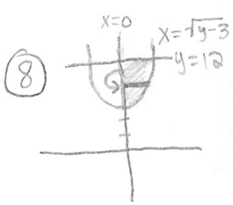
8. 

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