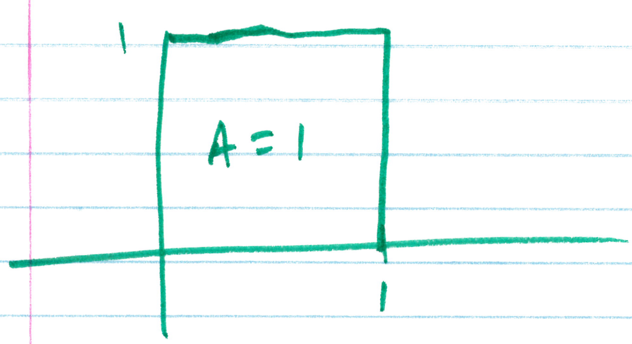
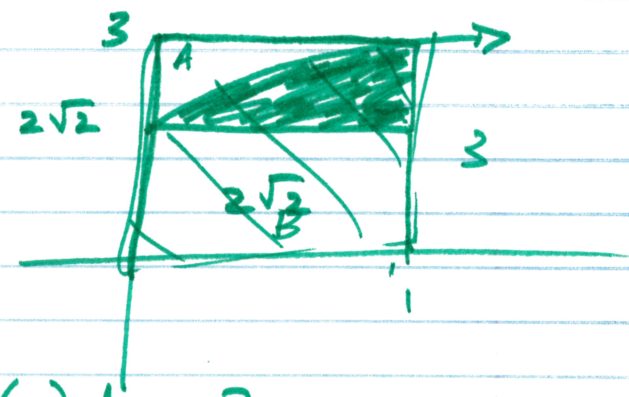
5.3

7. $\int_0^1 \sin(x^2)\,dx \neq 2$

8. $2\sqrt{2} < \int_0^1 \sqrt{x+8}\,dx < 3$





5. $\int_0^3 f(z)\,dz = 3 \qquad \int_0^4 f(z)\,dz = 7$

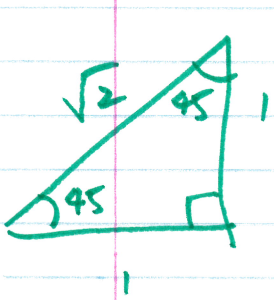
(a) $\int_3^4 f(z)\,dz = 4$

$$\int_0^4 f(z)\,dz = \int_0^3 f(z)\,dz + \int_3^4 f(z)\,dz$$

$$7 = 3 + \underline{\qquad}$$

(b) $\int_4^3 f(t)\,dt = -4$

27. $\int_{-1}^1 \frac{1}{1+x^2}\,dx = \Big|_{-1}^{1} \arctan x$



$= \arctan(1) - \arctan(-1)$

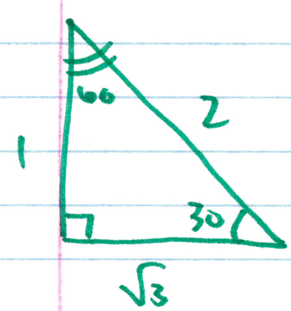
$= \frac{\pi}{4} - \frac{-\pi}{4} = \frac{\pi}{2}$

5.3

(29) $\int_1^e \frac{1}{x}\,dx = \Big|_1^e \ln|x| = \ln e - \ln 1 = 1$

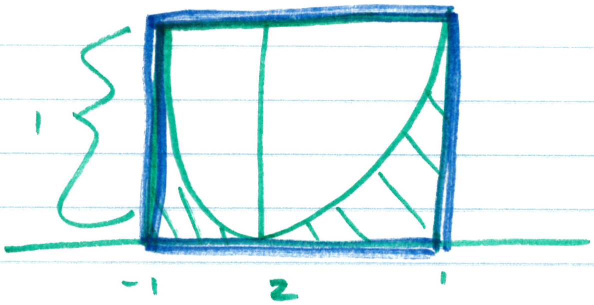
(28) $\int_0^{1/2} \frac{1}{\sqrt{1-x^2}}\,dx = \Big|_0^{1/2} \arcsin = \arcsin\frac{1}{2} - \arcsin 0$

$\frac{\pi}{6} - 0 = \frac{\pi}{6}$



5.3

(16) $f(t) = 1 - \sqrt{1-t^2}$; $[-1, 1]$



$2 - \frac{1}{2}\pi(1)^2 = \underline{2 - \frac{\pi}{2}}$

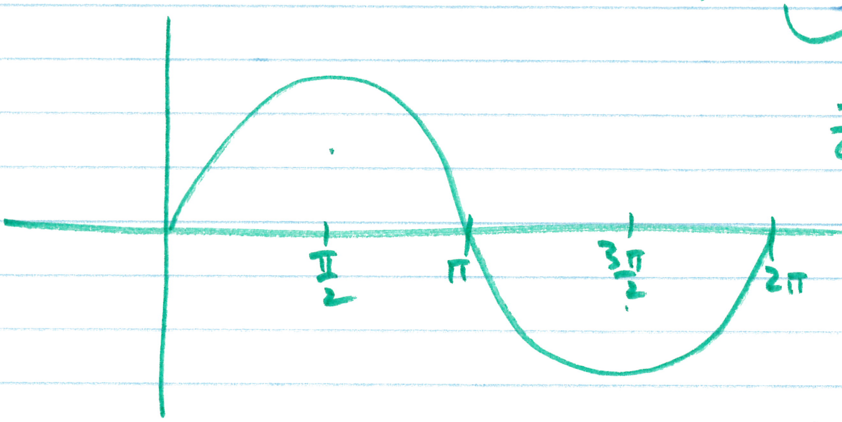
2×1

$\frac{1}{1--1} \underbrace{\int_{-1}^{1} f(t)\,dt}$

$\frac{1}{2}\left(2 - \frac{\pi}{2}\right)$

$\boxed{1 - \frac{\pi}{4}}$

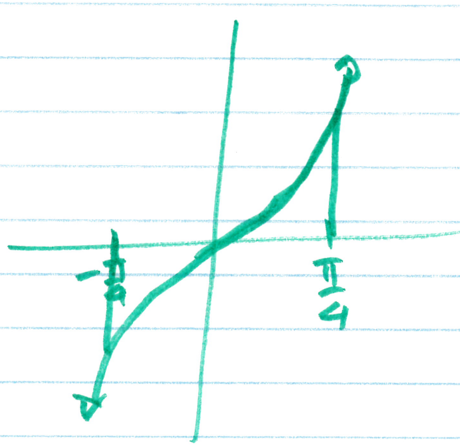
(17) $f(t) = \sin t$; $[0, 2\pi]$



$\frac{1}{2\pi - 0} \underbrace{\int f(t)\,dt}$

$\frac{1}{2\pi} \cdot 0 = 0$

(18) $f(t) = \tan t$; $[-\frac{\pi}{4}, \frac{\pi}{4}]$



$\frac{1}{\frac{\pi}{4} - -\frac{\pi}{4}} \underbrace{\int f(t)\,dt}_{0}$

$\frac{1}{\frac{\pi}{2}} \cdot 0 = 0$

5.3

(40) (a) 150+150 = 300 miles

(b) $\frac{150}{30} = 5$ hours $\frac{150}{50} = 3$ hours $5+3=8$ hours

(c) $\frac{300}{8} = 37.5$ mph

(d)

(41) $1000+1000 = 2000\,m^3$

$\frac{1000}{10} = 100$ min $\frac{1000}{20} = 50$ min   150 min

$\frac{2000}{150} = \cancel{6\,^2/_3\,m^3} \boxed{13\,^1/_3\ m^3/\text{min}}$

(14) $y=(x-1)^2,\ [0,3]$

$\frac{1}{3-0}\int_0^3 (x-1)^2\,dx$

$\frac{1}{3}\int_0^3 (x^2-2x+1)\,dx$

$\frac{1}{3}\Big|_0^3\ \frac{1}{3}x^3 - x^2 + x$

$\frac{1}{3}\left(\frac{1}{3}(3)^3 - 3^2 + 3\right) = \cancel{\frac{1}{3}(0)}$

$\frac{1}{3}(9-9+3) = \boxed{1}$

$(x-1)^2 = 1$

$x-1 = \pm 1$

$x-1=1$ $x-1=-1$

$\underline{x=2}$ $x=0$

$\boxed{c=0,\ c=2}$

(32) $y=\frac{1}{x},\ [e,2e]$

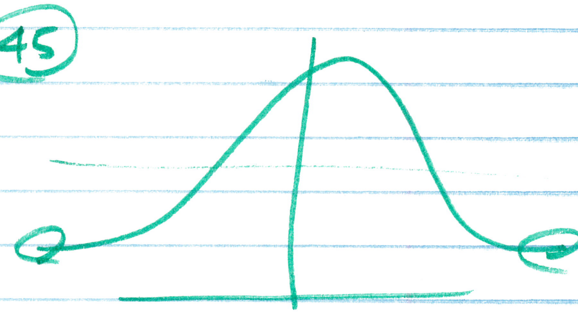
$\frac{1}{2e-e}\int_e^{2e} \frac{1}{x}\,dx$

$\frac{1}{e}\Big|_e^{2e} \ln|x|$

$\frac{1}{e}\left[\ln 2e - \ln e\right]$

$\frac{1}{e}\left[\ln 2 + \cancel{\ln e} - \cancel{\ln e}\right] = \frac{\ln 2}{e}$

(45)



5.3

$$\cancel{(b-a)}\ 50 \quad \frac{1}{\cancel{b-a}}\boxed{\int_a^b f(x)\,dx} = 10(b-a)$$

$$= 10b - 10a$$

5.3

(40) 30 mph 150 miles $\longrightarrow$ $\frac{150}{30} = 5$ hours

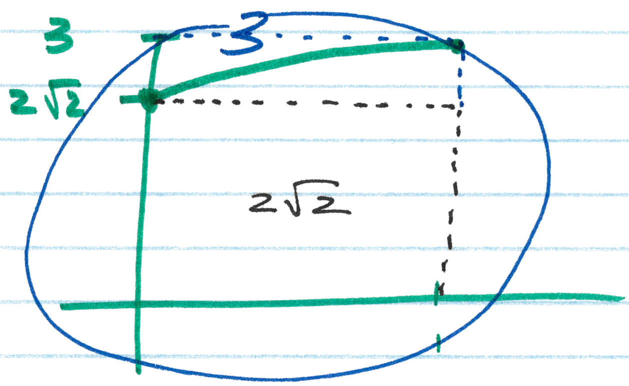
$\longleftarrow$ 50 mph 150 miles $\frac{150}{50} = 3$ hours

(a) 300 miles

(b) 8 hours

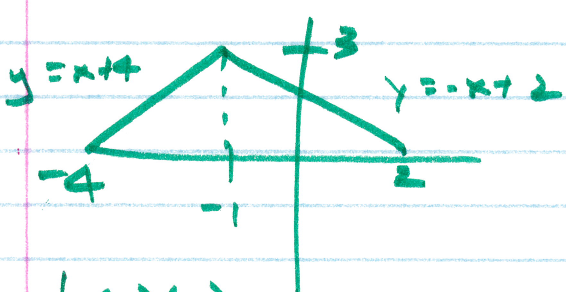
(c) $\frac{300}{8} \approx 37.5$

(8) $\int_0^1 \sqrt{x+8}$



(15) $f(x) = \begin{cases} x+4 & ; \ -4 \le x \le -1 \\ -x+2 & ; \ -1 < x \le 2 \end{cases}$

$\frac{1}{2--4} \int_{-4}^{-1} x+4 + \int_{-1}^{2} -x+2$



$\frac{1}{2}(3)(3)$

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

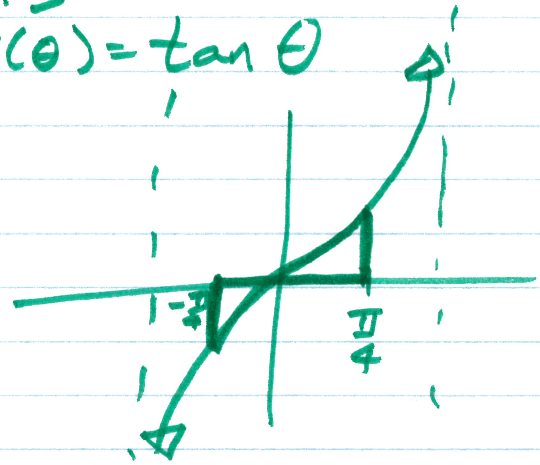
$\frac{9}{6} = \boxed{\frac{3}{2}}$

$\frac{1}{b-a} \underbrace{\int_a^b f(x)\,dx}$

$\frac{1}{6} \cdot 9$

5.3

(18) $f(\theta)=\tan\theta$



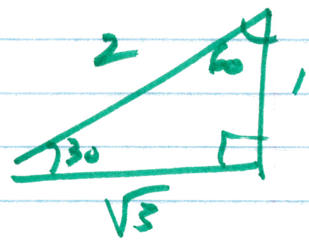
$\frac{0}{\frac{\pi}{2}} = 0$

$$\frac{1}{b-a}\underbrace{\int_a^b f(x)\,dx}_{0}$$

$$\frac{1}{\frac{\pi}{4}-\frac{-\pi}{4}}$$

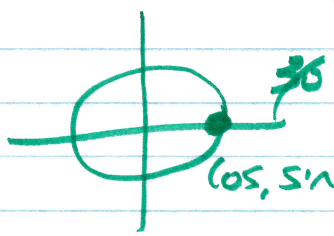
(28) $\int_0^{1/2}\frac{1}{\sqrt{1-x^2}}\,dx$

$\Big|_0^{1/2}\arcsin x$ $\Big|_0^{1/2}\sin^{-1}x$

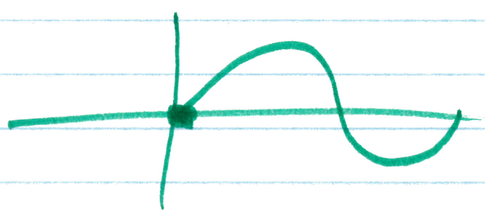


$\arcsin\frac{1}{2}-\arcsin 0$

$\frac{\pi}{6}-0=\boxed{\frac{\pi}{6}}$



$\cancel{30}\cdot\frac{\pi}{\cancel{180}}$
6



NINT = ON THE CALCULATOR

(11) $\frac{1}{\sqrt{3}-0}\int_0^{\sqrt{3}}(x^2-1)\,dx$

$$\frac{1}{\sqrt{3}-0}\int_0^{\sqrt{3}}(x^2-1)\,dx$$

$$\frac{1}{\sqrt{3}}\cdot 0=\boxed{0}$$

5.3

40 $\xrightarrow{30\text{mph}}$ 150 miles $\qquad \frac{150}{30} = 5$ hours

$\xleftarrow{50\text{mph}}$ 150 miles $\qquad \frac{150}{50} = 3$ hours

(a) 300 miles
(b) 8 hours
(c) $300/8 = 37.5$ mph

48 $\int_2^5 f(x)\,dx = 12 \qquad \int_5^8 \cancel{dx}\, f(x)\,dx = 4$

$$\cancel{\int_2^8 f(x)\,dx = 16}$$

$$\cancel{\int_2^5 f(x)\,dx - \int_5^8 3f(x)\,dx = 0}$$

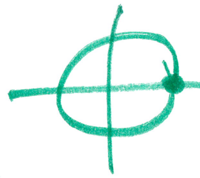
$$12 \quad -3(4)$$

$$\cancel{\int_5^2 f(x)\,dx = -12}$$

$$\boxed{\int_{-5}^{-8} f(x)\,dx = -4}$$

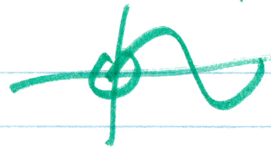
$$\int_2^6 f(x)\,dx + \int_6^8 f(x)\,dx = 16$$

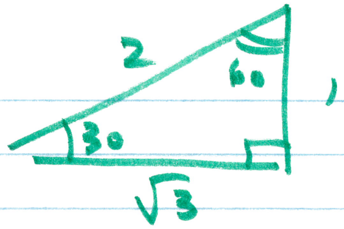
$$\cancel{\int_2^8 f(x)\,dx}$$



5, 3

(28) $\int_0^{1/2} \frac{1}{\sqrt{1-x^2}}\,dx$





$\left. \arcsin x \right|_0^{1/2}$

$\left. \sin^{-1} x \right|_0^{1/2}$

$\cancel{30} \cdot \frac{\pi}{\cancel{180}_{6}}$

$\arcsin \frac{1}{2} - \arcsin 0$

$\frac{\pi}{6} - 0 = \boxed{\frac{\pi}{6}}$

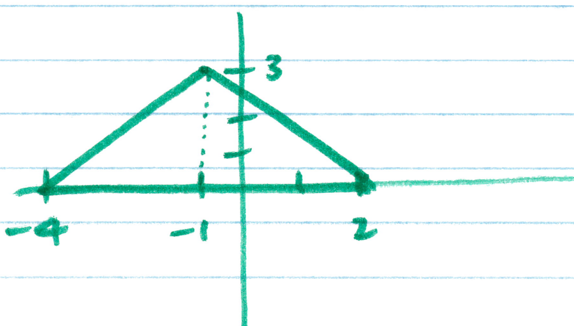
$\sin 0 = 0$

$\arcsin 0 = 0$

$\sin \frac{\pi}{6} = \frac{1}{2}$

$\arcsin \frac{1}{2} = \frac{\pi}{6}$

(15) $f(x) = \begin{cases} x+4; & -4 \le x \le -1 \\ -x+2; & -1 \le x \le 2 \end{cases}$



$\frac{1}{b-a} \underbrace{\int_a^b f(x)\,dx}$

$\frac{1}{2--4} \cdot 9$

$\frac{1}{2}(6)(3) = 9$

$\frac{1}{6} \cdot 9 = \boxed{\frac{3}{2}}$