

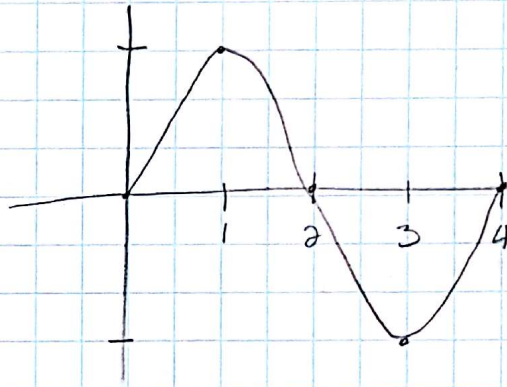
a) $q = 0.1$
 $p = 0.3$
 b) $P(B) = 0.5$

3) $f(x) = 3 \sin\left(\frac{\pi}{2}x\right) \quad 0 \leq x \leq 4$

a) i) amp = 3

ii) $\frac{2\pi}{b} = \text{period}$ $\frac{2\pi}{\pi/2} = \text{period}$

4 = period



4) $\frac{u_1}{5} \quad \frac{u_2}{9} \quad \frac{u_3}{13}$

a) $u_1 = 5 \quad d = 9 - 5 = 4$

$u_n = u_1 + (n-1)d$

$u_n = 5 + (n-1)4$

$u_n = 5 + 4n - 4$

$u_n = 1 + 4n$

$801 = 1 + 4n$

$800 = 4n$

$\boxed{200 = n} \checkmark$

b) $S_{200} = \frac{n}{2}(u_1 + u_n) = \frac{200}{2}(5 + 801) = 100(806) = \boxed{80600}$

5) $f(x) = x^2 + px + r$ vertex $(-1.5, y)$

a) $\frac{p}{2} = 4.5$

$x - 4.5 = -1.5$
 $+4.5 \quad +4.5$

$\boxed{x = 3} \checkmark$

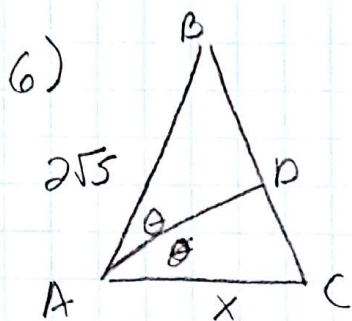
$x + 4.5 = -1.5$
 $-4.5 \quad -4.5$

$\boxed{x = -6} \checkmark$

b) $(x-3)(x+6) = x^2 - 3x + 6x - 18$

$x^2 + 3x - 18$

$\uparrow \quad \uparrow$
 $p \quad r$



$$\sin \theta = \frac{2}{3}$$

$$\Delta_{ABC} = 5 \text{ cm}^2$$

$$A_{ADC} + A_{ADB} = 5$$

$$A_{ABC} = \frac{1}{2} ab \sin 2\theta$$

$$= \frac{1}{2} ab (2 \sin \theta \cos \theta)$$

$$5 = (2\sqrt{5}) \times \left(\frac{2}{3}\right) \left(\frac{\sqrt{5}}{3}\right)$$

$$5 = \frac{20}{3} x$$

$$\frac{15}{20} = x$$

$$\boxed{x = \frac{3}{4} \text{ cm}}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\left(\frac{2}{3}\right)^2 + \cos^2 \theta = 1$$

$$\frac{4}{9} + \cos^2 \theta = 1$$

$$\sqrt{\cos^2 \theta} = \sqrt{\frac{5}{9}}$$

$$\cos \theta = \frac{\sqrt{5}}{3}$$

7) $3 \tan^4 x + 2k = -\tan^4 x + 8k \tan^2 x + k$ $0 \leq x \leq 1$ $k > 0$

$$\boxed{4 \tan^4 x - 8k \tan^2 x + k = 0}$$

$$4 \tan^4 x = 8k \tan^2 x - k$$

$$4 \tan^4 x = k(8 \tan^2 x - 1)$$

$$\frac{4 \tan^4 x}{8 \tan^2 x - 1} = k$$

$$x = \frac{\pi}{4}$$

$$\frac{4}{8-1} = \frac{4}{7}$$

$$x = 0$$

$$\frac{4(0)}{8(0)-1} = \frac{0}{-1} = 0$$

$$a = 4$$

$$b = -8k$$

$$c = k$$

$$b^2 - 4ac = 0$$

$$(-8k)^2 - 4(4)k = 0$$

$$64k - 16k = 0$$

$$16k(4k - 1) = 0$$

$$16k = 0 \quad 4k - 1 = 0$$

$$\boxed{k = \frac{1}{4}}$$

8) a) median = 38

b) i) 20

ii) $30 + 14 = 44$

c) $20 \cdot 40 = 800$

$$\frac{-745}{55 \text{ cans}}$$

d) i) $50(1) = 50$

ii) $\frac{64}{80}$ raised less $\frac{16}{80}$ raised more $\rightarrow 20\%$

e) i) 41.4

ii) 18.5

$$a) \begin{aligned} 0 &= 6 - 2x \\ \cancel{6x - x^2} & \\ 0 &= 6 - 2x \\ 2x &= 6 \\ \boxed{x=3} \end{aligned}$$

$$b) \begin{aligned} u &= 6x - x^2 \\ du &= 6 - 2x \end{aligned} \quad \int \frac{6-2x}{6x-x^2} dx = \int \frac{1}{u} du = \ln(6x-x^2) + C$$

$$\ln(6(3)-3^2) + C = \ln 27$$

$$\ln(18-9) + C = \ln 27$$

$$\ln(9) + C = \ln 27$$

$$\therefore C = \frac{\ln 3^3}{\ln 3^2} = \frac{3 \ln 3}{2 \ln 3} = \frac{3}{2}$$

$$F(x) = \ln(6x-x^2) + \frac{3}{2}$$

$$c) P(3, \ln 27)$$

$$a=3, b=3$$

$$\ln 27 \cdot \frac{1}{\ln 3} = \frac{\ln 3^3}{\ln 3} = \frac{3 \ln 3}{\ln 3} = 3$$

$$a) \begin{aligned} F(x) &= \sqrt{4x+5} \\ &= (4x+5)^{1/2} \\ F'(x) &= \frac{1}{2}(4x+5)^{-1/2} (4) \end{aligned}$$

$$F'(x) = \frac{2}{\sqrt{4x+5}}$$

$$F'(1) = \frac{2}{\sqrt{4+5}} = \frac{2}{\sqrt{9}} = \frac{2}{3}$$

$$b) R(1, y)$$

$$g'(1) = 3$$

$$c) \frac{g}{g}(1)$$

$$y = 3x + 6$$

$$y = 9(3(1) + 6)$$

$$a) \begin{aligned} h'(1) &= f(1) \cdot g'(1) + f'(1) \cdot g(1) \\ &= 3 \cdot 3 + \frac{2}{3} (9) \\ &= 9 + 6 = 15 \end{aligned}$$

$$h(1) = f(1) \cdot g(1) = 3 \cdot 9 = 27$$