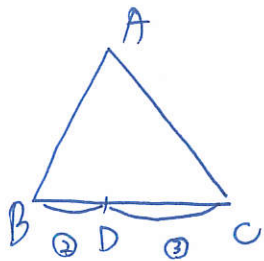


1. $(\sqrt{10}-3)K = \sqrt{10}+3$, $K = \frac{\sqrt{10}+3}{\sqrt{10}-3} \times \frac{\sqrt{10}+3}{\sqrt{10}+3} = (\sqrt{10}+3)^2 = 19+6\sqrt{10}$, 選(4) →

2. $f(x) = 3(x+1)^3 + 4(x+1) + a$, $\because (-1, a)$ 是中心 $\therefore f(-3) + f(1) = 2a = 10$, $a = 5$

$\therefore f(1) = 3 \times 2^3 + 4 \times 2 + 5 = 37$, 選(5) #

3.



$\because \vec{BD} \parallel \vec{CD}$

$\therefore \vec{AB}$ 在 \vec{BD} 上之正射影與 \vec{AB} 在 \vec{CD} 上之正射影相同

$\therefore \begin{cases} x^2 - 4 = 4, & x = 2 \\ 17 = 2^y + 1, & y = 4 \end{cases}$

選(3) #

4.

$E(\text{甲}) = 20000 \times 20\% + 60000 \times 5\% - 500 = 6500$

$E(\text{乙}) = 50000 \quad 50000 \quad -666 = 11834$

$E(\text{丙}) = 40000 \quad 60000 \quad -800 = 10200$

$E(\text{丁}) = 50000 \quad 60000 \quad -888 = 12112$

$E(\text{戊}) = 60000 \quad 60000 \quad -1000 = 14000$

選(5) →

5.

$a_{11} = 11^2 - 10^2 = 21$

$\therefore \frac{a_{11}}{b_{11}} = \frac{2100}{21}$

$b_{11} = \frac{11^2}{10^2} = \frac{121}{100}$

選(1) →

6.

赤道半徑 R , 北緯 40° 半徑 $R \cdot \cos 40^\circ$

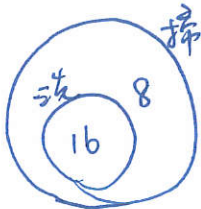
$\therefore \text{時間比} = \frac{R \cdot \cos 40^\circ}{R} = \cos 40^\circ$, 選(3) #

7.

$$\frac{\text{有病檢測陰}}{\text{沒病檢測陰} + \text{有病檢測陰}} = \frac{5\% \times 10\% \times 10\%}{95\% \times 90\% \times 90\% + 5\% \times 10\% \times 10\%}$$

$= \frac{1}{19 \times 9 \times 9 + 1} = \frac{1}{1540}$, 選(2) #

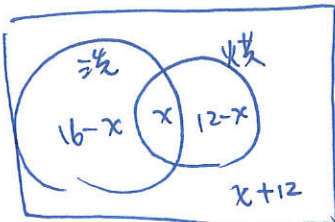
8. (1)



正確 (10)

(2)

(3)



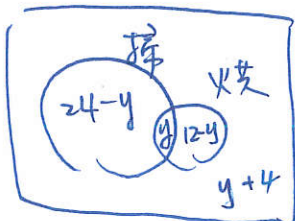
$$\begin{cases} 16-x \geq 0 \\ x \geq 0 \\ 12-x \geq 0 \\ x+12 \geq 0 \end{cases}$$

$$\Rightarrow 0 \leq x \leq 12$$

同時有 \equiv 機最多12人, 最少0人

(4)

(5)



$$\begin{cases} 24-y \geq 0 \\ y \geq 0 \\ 12-y \geq 0 \\ y+4 \geq 0 \end{cases}$$

$$\Rightarrow 0 \leq y \leq 12$$

$$4 \leq y+4 \leq 16$$

同時沒有 \equiv 機最多16人, 最少4人

20
洗 (1)(2)(3) (4)(5) *

9.

(1) $N \times 1.1 \times 0.9 = 0.99N < N$ (0)

(2)

$$N \times 1.1^3 = 1.331N, \geq 3 \times 0.331N$$

$$N \times 0.9^3 = 0.729N, \geq 3 \times 0.271N$$
 (0)

(3)

$$N \times 1.1^n = 2N, \quad 1.1^n = 2, \quad \log 1.1^n = \log 2, \quad n \log 1.1 = \log 2$$

$$\therefore n = \frac{\log 2}{\log 1.1} \approx \frac{0.3010}{0.041} = 7, \dots, \text{至少 } 8 \text{ 天 } (x)$$

(4)

$$N \times 0.9^n = \frac{1}{2}N, \quad 0.9^n = \frac{1}{2}, \quad \log\left(\frac{9}{10}\right)^n = \log \frac{1}{2}, \quad n(\log 9 - 1) = -\log 2$$

$$\therefore n = \frac{\log 9 - 1}{-\log 2} \approx \frac{0.9542 - 1}{-0.3010} = 6, \dots, \text{至少 } 7 \text{ 天 } (10)$$

(5)

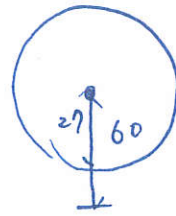
$$N \times (0.9)^6 = 0.5, \quad N \times (10^{\log 0.9})^6 = (10^{\log 5})^2$$

$$N \times 10^{6 \times (0.9542 - 1)} = 10^{2 \times 0.699}, \quad N = 10^{1.6728} = 10^1 \times 4.7 = 47 \quad (10)$$

20
洗 (1)(2)(4)(5) *

10. $f(t) = a \sin(bt+c) + d$

基準 $y=60 \rightarrow d=60$



1) 振幅 $a=27$ (x)

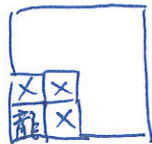
2) 轉 1 圈 4 分鐘 (x) $\Rightarrow b = \frac{2\pi}{4} = \frac{\pi}{2}$

3) $f(0)$ 為最低點, $f(0) = 60 - 27 = 33$ (x)

4) 6 分鐘轉 1 圈半, 在最高點 $\therefore f(6)$ 為最大值 10

5) $f(t) = 27 \sin\left(\frac{\pi}{2}t + c\right) + 60$ (x) 波 (4)

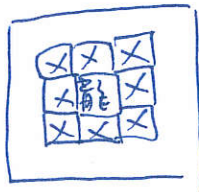
11. 1) $P = \frac{C_2^{24-3}}{C_2^{24}}$ (0)



2) $P = \frac{C_2^{24-5}}{C_2^{24}}$ (x)



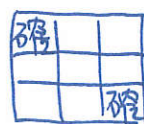
3) $P = \frac{C_2^{24-8}}{C_2^{24}}$ (0)




4) 如 圖 1),

$$P = \frac{\left[\overset{\text{左右}}{4 \times 4 + 3} + \overset{\text{上下}}{3 + 4 \times 4} \right]}{C_2^{24}} \quad (x)$$

5) 15 人被排列 $\Rightarrow 8+8-1$, 即 2 人在中間, 且有 1 個人重疊

\therefore  \rightarrow 兩位確診者, 坐在斜線, 中間隔一人

) 只有 2 種方法, $\Rightarrow P = \frac{2}{C_2^{24}}$ (0) 波 (1)(3)(5)

12.

1) $18548 \times 1\% \xrightarrow{\text{無條件進位}} 186 \text{ (x)}$

2) $1.437 \times 60 = 86.22 \text{ (0)}$

3) $1.437 \times 29 < x \leq 1.437 \times 30, \Rightarrow 41.673 < x \leq 43.11 \text{ (x)}$

4) 前 0.1% 基準點 $\frac{2}{10}$, 級距變大 (x)

5) 前 1% 和前 0.1% 平均不同 (x)

例 (2) #

13.

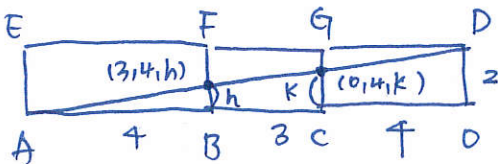
BMI 36 \Rightarrow 體重 = 36×1.8^2

BMI 32 \Rightarrow 體重 = 32×1.8^2

\Rightarrow 減重 $4 \times 1.8^2 = 4 \times 3.24 = 12.96 \approx 13 *$

14.

圖解



$\frac{h}{4} = \frac{2}{11}, \quad \frac{k}{4} = \frac{2}{11}$

$\therefore h = \frac{8}{11}, \quad k = \frac{14}{11}$

$3h - k = \frac{10}{11} \#$

15.

$\begin{bmatrix} 1 & 2 \\ 3 & 9 \\ x & y \end{bmatrix}_{3 \times 2} \quad A = \begin{bmatrix} 16 & 5 \\ 66 & 18 \\ 62 & 22 \end{bmatrix}_{3 \times 2}$

$\Rightarrow A$ 是 2×2 矩陣

$\Rightarrow \begin{bmatrix} 1 & 2 \\ 3 & 9 \end{bmatrix} A = \begin{bmatrix} 16 & 5 \\ 66 & 18 \end{bmatrix}, \quad A = \begin{bmatrix} 1 & 2 \\ 3 & 9 \end{bmatrix}^{-1} \begin{bmatrix} 16 & 5 \\ 66 & 18 \end{bmatrix} = \frac{1}{3} \begin{bmatrix} 9 & -2 \\ -3 & 1 \end{bmatrix} \begin{bmatrix} 16 & 5 \\ 66 & 18 \end{bmatrix}$
 $= \begin{bmatrix} 4 & 3 \\ 6 & 1 \end{bmatrix}$

$[x \ y] A = [62 \ 22]$

$\Rightarrow [x \ y] = [62 \ 22] A^{-1} = [66 \ 22] \times \frac{1}{-14} \begin{bmatrix} 1 & -3 \\ 6 & 4 \end{bmatrix} = [5 \ 7]$
 $\underline{x+y=12} \#$

16.

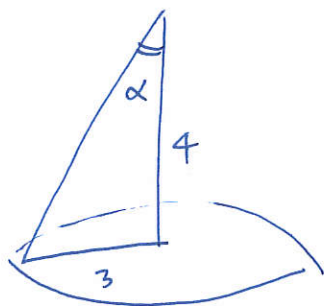
$$\triangle EFH = \triangle CEF + \triangle CEH + \triangle CFH$$

$$= \frac{1}{2} \times 7 \times 4 + \frac{1}{2} \times 7 \times 5 \times \sin(90^\circ + C) + \frac{1}{2} \times 5 \times 4 \times \sin(180^\circ - C)$$

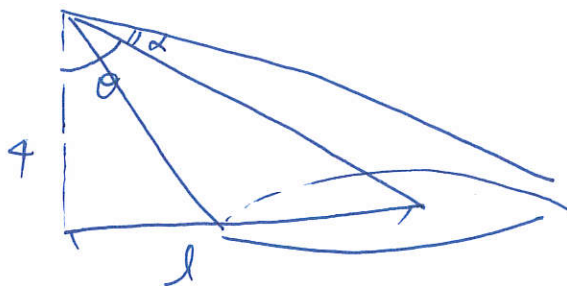
$$= 14 + \frac{35}{2} \times \cos C + 10 \times \sin C = 14 + 14 + 6 = 34$$

17.

$\tan \theta = \frac{3}{4}$, $\tan 2\theta = \frac{2(\frac{3}{4})}{1 - (\frac{3}{4})^2} = \frac{\frac{3}{2}}{\frac{7}{16}} = \frac{24}{7}$
 $\tan 2\theta = \frac{l}{4} = \frac{24}{7} \Rightarrow l = \frac{96}{7}$



→



當 $\theta + \alpha < 90^\circ$ 時，地板亮區為橢圓。

$\theta + \alpha = 90^\circ$ 時，... 拋物線

$\theta + \alpha > 90^\circ$ 時，... 橢圓

$$\tan \alpha = \frac{3}{4} \quad \therefore \tan \theta = \tan(90^\circ - \alpha) = \frac{4}{3}$$

$$\therefore l = 4 \cdot \tan \theta = \frac{16}{3} \approx 5.33$$

18.

$$(1) \sqrt{8^2+4^2} = \sqrt{80} < 10$$

$$(2) \sqrt{3^2+4^2} = 5 < 10$$

$$(3) \sqrt{5^2+12^2} = 13 > 10$$

$$(4) \sqrt{5^2+5^2} = \sqrt{50} < 10$$

$$(5) \sqrt{6^2+9^2} = \sqrt{117} > 10$$

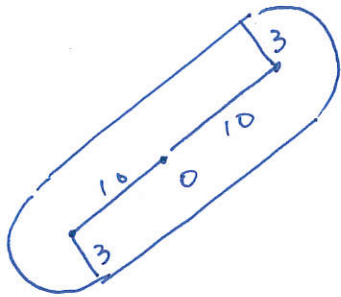
(1)(2)(4)

19.

設 $3x-4y=k$ 且 $3x-4y=0$ 則距離為 $\frac{|k|}{5} = 3$, $k = \pm 15$

即求 $-15 \leq 3x-4y \leq 15$

20.



$$\therefore \text{面積} = 20 \times 6 + \pi \times 3^2$$

$$= 120 + 9\pi$$