



$$\log x = \log \frac{\sqrt[3]{88.3}}{\sqrt{2.56}} = \frac{1}{3} \log 88.3 - \frac{1}{2} \log 2.56$$

$$= \frac{1}{3} \times 1.946 - \frac{1}{2} \times 0.4082 \doteq 0.4446$$

$$\therefore \log 2.7 < \log x < \log 2.8 \Rightarrow 2.7 < x < 2.8$$

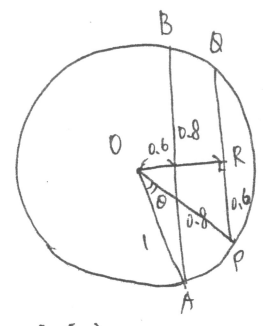
(2) #

7. 設  $\angle AOP = \theta, \angle AOR = \alpha, \angle POR = \beta \Rightarrow \theta = \alpha - \beta$

$$\sin \theta = \sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$= \frac{4}{5} \times \frac{4}{5} - \frac{3}{5} \times \frac{3}{5} = \frac{7}{25} = 0.28$$

$$\Rightarrow 16^\circ < \theta < 17^\circ$$



(4) #

- \* 注意此題需t增加
- $\sin 13^\circ = 0.2250$
  - $\sin 14^\circ = 0.2419$
  - $\sin 15^\circ = 0.2588$
  - $\sin 16^\circ = 0.2756$
  - $\sin 17^\circ = 0.2924$
  - $\sin 18^\circ = 0.3090$

8.

- (1) a: 開口, 開口朝上  $\therefore a > 0$
- (2) b: 與 y 軸交點之切線斜率, 此切線斜率為正  $\therefore b > 0$
- (3) c: 與 y 軸交點之 y 坐標, 此坐標為負  $\therefore c < 0$
- (4)  $b^2 - 4ac$ : 與 x 軸之交點個數, 有 2 個交點  $\therefore b^2 - 4ac > 0$
- (5)  $a - b + c = f(-1)$ , 即  $x = -1$  之 y 坐標為負  $\therefore a - b + c < 0$

(3)(5) #

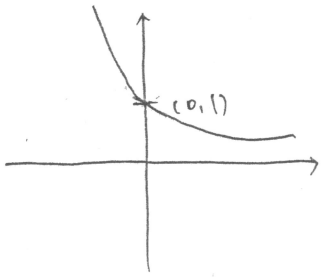
9. (1) 正確 (直線方向當法向量, 又過一定點)

- (2) 有無限多平面可滿足此性質
- (3) 有無限多直線可滿足此性質
- (4) 有無限多平面可滿足此性質
- (5) 正確 (平面法向量固定, 且過一定點)

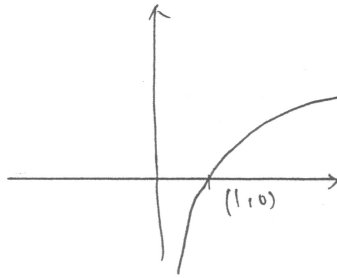
(1)(5) #

10.

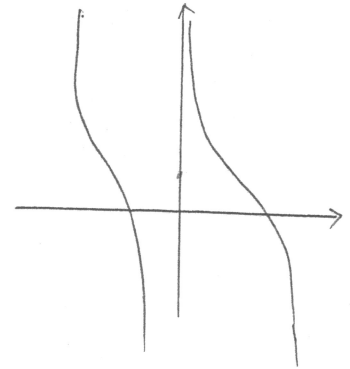
(1)  $y = (\frac{1}{2})^x$  圖形為



(2)  $y = \log_2 x$  圖形為



(3)  $y = \cot x$  圖形為



(4)  $5x^2 + 4x - 6y - 3 = 0$

$\Rightarrow y = \frac{5}{6}x^2 + \frac{4}{6}x - \frac{3}{6}$

圖形為向上的拋物線

(5)  $x^2 - y^2 + 4x - 6y - 10 = 0$

$\Rightarrow (x+2)^2 - (y+3)^2 = 10 + 4 - 9$

$\Rightarrow \frac{(x+2)^2}{5} - \frac{(y+3)^2}{5} = 1$

圖形為左右型的雙曲線

(3)(4)(5) #

二、

1、

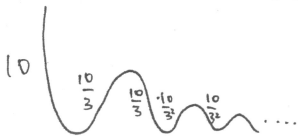
$\begin{cases} y = 4^x \\ y = 2^{3x+2} \end{cases} \Rightarrow 4^x = 2^{3x+2} \Rightarrow 2^{2x} = 2^{3x+2} \Rightarrow 2x = 3x+2 \Rightarrow x = -2$

此時  $y = 4^{-2} = \frac{1}{16}$

-2 #

2.

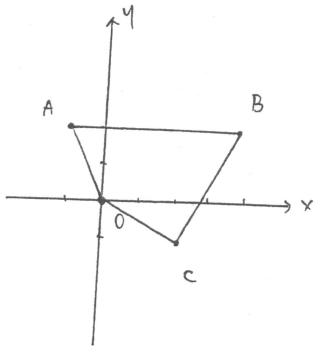
路程  $\Rightarrow 10 + 2(\frac{10}{3} + \frac{10}{3^2} + \frac{10}{3^3} + \dots)$



$= 10 + 2 \times \frac{\frac{10}{3}}{1 - \frac{1}{3}} = 20$

20 #

3.



$\vec{OC}: m_{OC} = -\frac{1}{2}$ .  $\vec{OC}$  方程式  $y = -\frac{1}{2}x \Rightarrow x + 2y = 0$

過 B 平行  $\vec{OC}$  方程式為  $x + 2y = 8$

$\vec{OA}: m_{OA} = -2$ .  $\vec{OA}$  方程式  $y = -2x$

$\begin{cases} x + 2y = 8 \\ y = -2x \end{cases} \Rightarrow x = -\frac{8}{3}, y = \frac{16}{3}$

$D(-\frac{8}{3}, \frac{16}{3})$

$(-\frac{8}{3}, \frac{16}{3})$  #

4. 滿足  $\overline{PA} = \overline{PB} \Rightarrow P$  在  $\overline{AB}$  之中垂線上

$AB$  中點為  $(2, 3)$  且  $m_{AB} = 1$

$\therefore AB$  之中垂線方程式為  $y - 3 = -1(x - 2) \Rightarrow x + y = 5$

又  $P$  在  $x + 2y = 3$  上,  $\begin{cases} x + y = 5 \\ x + 2y = 3 \end{cases} \Rightarrow y = -2, x = 7$

$(7, -2)$  #

5. 相切 (若是圓錐曲線)  $\Rightarrow$  只有一個交點

$$\begin{cases} x^2 + y^2 + 2x - 3 = 0 \\ y = mx + 3 \end{cases}$$

$$\Rightarrow x^2 + (mx + 3)^2 + 2x - 3 = 0$$

$$\Rightarrow x^2 + m^2x^2 + 6mx + 9 + 2x - 3 = 0$$

$$\Rightarrow (1 + m^2)x^2 + (6m + 2)x + 6 = 0$$

$$\because \text{只有一解} \Rightarrow D = b^2 - 4ac = 0 \Rightarrow (6m + 2)^2 - 4 \times (1 + m^2) \times 6 = 0$$

$$\Rightarrow (3m + 1)^2 - 6(1 + m^2) = 0$$

$$\Rightarrow 9m^2 + 6m + 1 - 6 - 6m^2 = 0$$

$$\Rightarrow 3m^2 + 6m - 5 = 0$$

$$\Rightarrow m = \frac{-6 \pm \sqrt{36 + 60}}{6} = -1 \pm \frac{2\sqrt{6}}{3}$$

6.  $x^2 + y^2 + z^2 + 2x - 4y - 11 = 0$

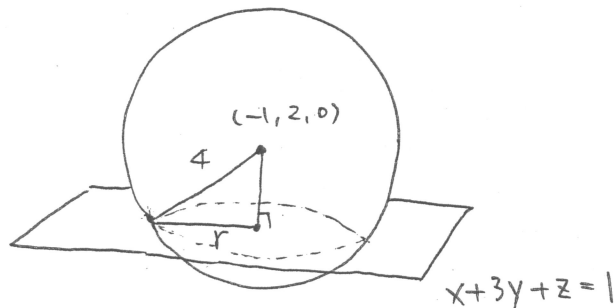
$$\Rightarrow (x + 1)^2 + (y - 2)^2 + z^2 = 11 + 1 + 4 = 16$$

求  $(-1, 2, 0)$  到平面  $x + 3y + z = 1$  的距離

$$= \frac{|-1 + 6 + 0 - 1|}{\sqrt{1^2 + 3^2 + 1^2}} = \frac{4}{\sqrt{11}}$$

$$\Rightarrow 16 = \frac{16}{11} + r^2 \Rightarrow r^2 = \frac{160}{11}$$

$$\text{圓面積} = \pi r^2 = \frac{160}{11} \pi$$



7.  $\Delta: \begin{cases} x-y+z=1 \\ x+y-z=1 \end{cases}$  兩面式先化參數式

方向向量

$$\begin{array}{cccccc} 1 & -1 & 1 & 1 & -1 & \\ \hline & 1 & -1 & 1 & 1 & \\ \hline & 0 & 2 & 2 & & \end{array}$$

$\therefore \vec{n} \parallel (0, 1, 1)$

點 設  $z=0 \Rightarrow \begin{cases} x-y=1 \\ x+y=1 \end{cases} \Rightarrow x=1, y=0$

$(1, 0, 0)$

$\Delta$  參數式  $\begin{cases} x=1 \\ y=t \\ z=t \end{cases} t \in \mathbb{R}$

$\Rightarrow (1, 2, 3)$  到直線  $\Delta$  的距離為

$$\begin{aligned} &= \sqrt{(1-1)^2 + (t-2)^2 + (t-3)^2} \\ &= \sqrt{t^2 - 4t + 4 + t^2 - 6t + 9} = \sqrt{2t^2 - 10t + 13} \\ &= \sqrt{2(t - \frac{5}{2})^2 + 13 - \frac{25}{2}} = \sqrt{2(t - \frac{5}{2})^2 + \frac{1}{2}} \end{aligned}$$

$\therefore$  最近點坐標  $t = \frac{5}{2}$   
 $\Rightarrow (1, \frac{5}{2}, \frac{5}{2})$

$(1, \frac{5}{2}, \frac{5}{2})$  #

8. 設三邊長為  $x, y, z$ , 不失一般性設  $x \geq y \geq z$

又  $x < y+z \quad \therefore x < 10 \quad \because x$  為整數  $\Rightarrow x \leq 9$

$x+y+z=20$

$20 = 9+9+2 = 9+8+3 = 9+7+4 = 9+6+5$

$= 8+8+4 = 8+7+5 = 8+6+6 \Rightarrow$  共 8 種

$= 7+7+6$

8 \*

9. 看到  $\sin \theta, \cos \theta$  解方程  $\Rightarrow \sin^2 \theta + \cos^2 \theta = 1$

$$\begin{cases} \sin^2 \theta + \cos^2 \theta = 1 & \text{--- ①} \\ \sin \theta + \cos \theta = \frac{1}{5} \Rightarrow \sin \theta = \frac{1}{5} - \cos \theta & \text{--- ②} \end{cases}$$

②代入①  $\Rightarrow (\frac{1}{5} - \cos \theta)^2 + \cos^2 \theta = 1 \Rightarrow \frac{1}{25} - \frac{2}{5} \cos \theta + 2 \cos^2 \theta = 1$

$\Rightarrow 2 \cos^2 \theta - \frac{2}{5} \cos \theta - \frac{24}{25} = 0 \Rightarrow 50 \cos^2 \theta - 10 \cos \theta - 24 = 0$

$\Rightarrow 25 \cos^2 \theta - 5 \cos \theta - 12 = 0 \Rightarrow (5 \cos \theta - 4)(5 \cos \theta + 3) = 0$

$\Rightarrow \cos \theta = \frac{4}{5}$  or  $\frac{-3}{5} \quad \because \theta \in \mathbb{R} \Rightarrow \cos \theta = \frac{4}{5}$

$\frac{4}{5}$  #  
P5

10. 關於最高公因式、最低公倍式  $\implies$  一定是要用  $\begin{matrix} \text{最高公因式} \\ \text{最大公因數} \end{matrix}$  83學測

設最高公因式 H.C.F,  $\because$  最低公倍式 四=次  $\implies$  最高公因式 一=次

$$\begin{array}{l} \text{H.C.F} \mid x^2 + px + 6 \\ \text{H.C.F} \mid x^3 + px + 6 \end{array} \implies \text{H.C.F} \mid (x^3 + px + 6) - (x^2 + px + 6) = x^3 - x^2$$

$$\text{H.C.F} \mid x^3 + px + 6$$

$$\implies \text{H.C.F} \mid x^2(x-1)$$

$$(\because x \nmid x^2 + px + 6 \implies x \nmid \text{H.C.F})$$

$$\implies \text{H.C.F} \mid x-1$$

又 H.C.F 為 一=次式  $\therefore \text{H.C.F} = x-1$

$$\because x-1 \mid x^2 + px + 6 \implies 1 + p + 6 = 0 \implies p = -7$$

-7 #