1. 未知數在指數或指數位置無法處理 ⇒ 取 log.

$\log a = \frac{1}{2}\log\frac{1}{2} = -0.1505$

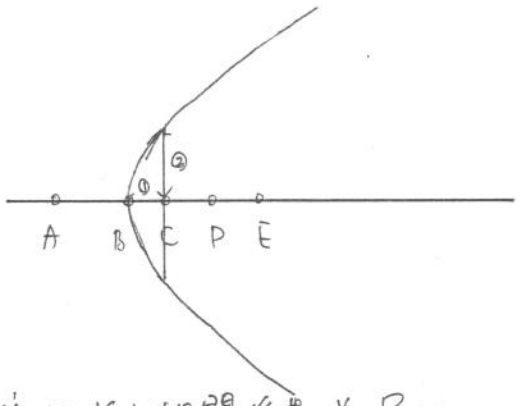
$\log b = \frac{1}{3}\log\frac{1}{3} = -0.1590\cdots \Rightarrow a = c > b$

$\log c = \frac{1}{4}\log\frac{1}{4} = -0.1505$

(3) #

2.

利用正焦弦長 $= 4|c|$ 的關係判斷.



⇒ C

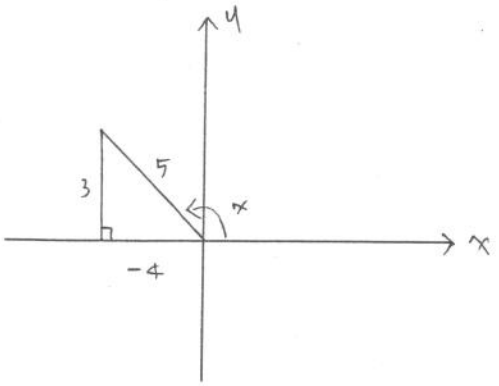
(3) #

3. ※ W, Y 之相關係數為 R_{WY}
平移, 伸縮均不影響相關係數大小
但伸縮影響相關係數之正負.

$\Rightarrow R_{WY} = -R_{XY}$ ($W = -7X + 16$)

(5) #

4. $\sin x = \frac{3}{5}$, $x \in \text{II}$



$\cos x = \frac{-4}{5}$

$\tan x = \frac{3}{-4}$

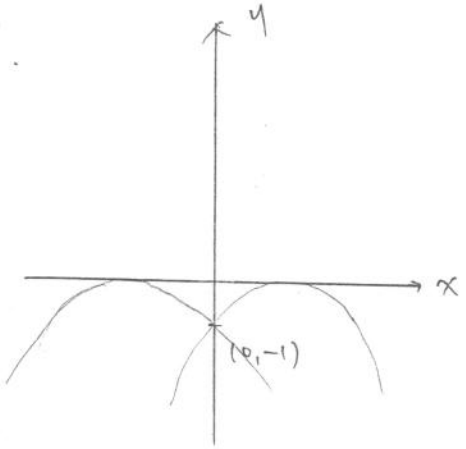
$\cot x = \frac{-4}{3}$

$\sec x = \frac{5}{-4}$

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

(3)(4)(5) #

5.



(1) a：開口朝下 $\Rightarrow a<0$

(2) b：與 y 軸交點之切線斜率 $\Rightarrow$ 不一定

(3) c：與 y 軸之交點之 y 坐標 $\Rightarrow c=-1<0$

(4) b^2-4ac：與 x 軸之交點個數 $=1 \Rightarrow b^2-4ac=0$
(沒有 b^2+4ac)

(5) $a+b+c=f(1)\leq 0$
(拋物線圖形必在 x 軸下方)

(1)(3) (5) ✱

6. $a=bq+r \Rightarrow (a,b)=(b,r)$ or $(a,q)=(q,r)$

(1)(4) ✱

7. 設踢進 x 球；罰進 y 球 $\Rightarrow$ 得分 $16x+6y$ $(x,y\in \mathbb{N})$

基本上 $16x+6y$ = 2的倍數，但 $x,y\in\mathbb{N}$ ∴ 太小的不一定能湊出
$(x,y\in\mathbb{Z})$

(1) 26 湊不出來

(2) $28=16\times 1+6\times 2$

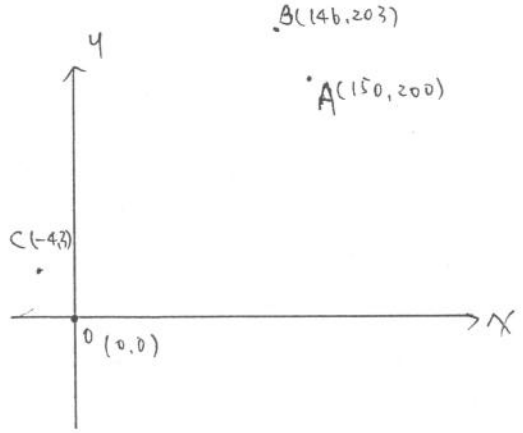
(3) $82=16\times 4+6\times 3$

(4) 103 是奇數 $\Rightarrow$ 不可能

(5) $284=16\times 2+6\times 42$

(2)(3)(5) ✱

8.



不難注發現 $\vec{AB}=(-4,3)=\vec{OC}$

且 $\vec{BC}\parallel\vec{AO}$ ∴ ABCO 為平行四邊形.

$\vec{OC}\cdot\vec{OA}=0$ ∴ $\vec{OC}\perp\vec{OA}$

∴ ABCO 為長方形.

∵ $\overline{OA}\neq\overline{OC}$ ∴ ABCO 不為正方形.

⇒對角線不垂直.

$\overline{AC} = \sqrt{\overline{OC}^2 + \overline{OA}^2} = \sqrt{5^2 + 250^2} = \sqrt{625 \times 5} < 251$

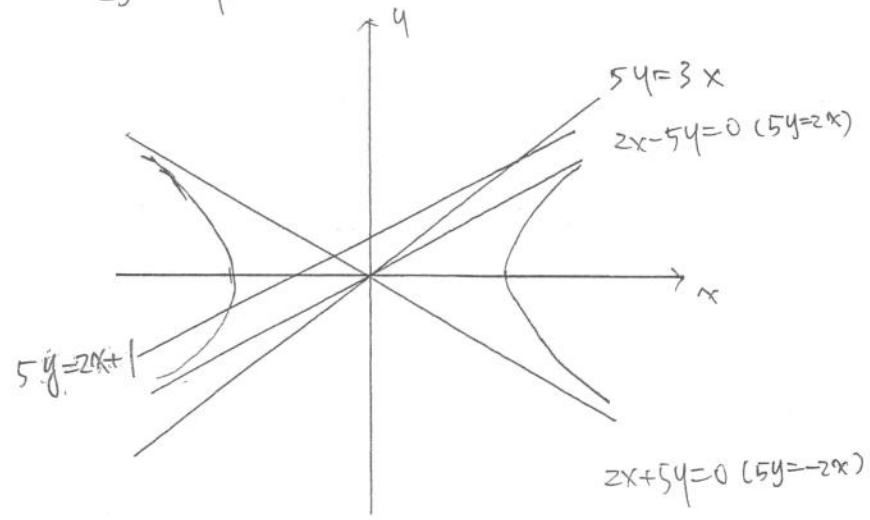
$(251^2 = 63001)$

面積 $= \overline{OC} \cdot \overline{OA} = 5 \cdot 250 = 1250$.

(1)(2)(5) ※

9.

$\frac{x^2}{25} - \frac{y^2}{4} = 1$ 之漸近線為 $\frac{x}{5} \pm \frac{y}{2} = 0 \Rightarrow 2x \pm 5y = 0$



(1)(2)(3)(4) 見右圖

(5) $y=100$ 是水平線. 一定有交點.

(1)(2)(4) ※

10.

(1) $|z^6| = 1 \Rightarrow |z|^6 = 1 \Rightarrow |z| = 1$

(2) $z^6 = 1 \Rightarrow z^6 - 1 = 0 \Rightarrow (z^2-1)(z^4+z^2+1) = 0$

$\Rightarrow z^2 = 1$ or $z^4 + z^2 + 1 = 0$ ∴不一定

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

$\Rightarrow z^3 = 1$ or -1

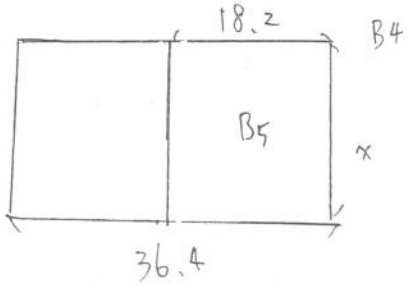
(4) $|z^4| = |z|^4 = 1$

(5) $z^6 - 1 = 0 \Rightarrow (z-1)(z^5+z^4+z^3+z^2+z+1) = 0 \quad \because z \neq 1$

$\Rightarrow z^5+z^4+z^3+z^2+z+1 = 0$

(1)(3)(4)(5) ※

A.



設 B_4 短邊 x.

$\because B_4, B_5$ 相似

$\Rightarrow \frac{36.4}{x} = \frac{x}{18.2} \Rightarrow x = 18.2\sqrt{2}$

$\Rightarrow x = 25.7348$

25.7 #

B.

滿意市長施政人數 $= 600\times 36\% + 400\times 46\% = 216+184 = 400$

全體施政滿意度 $= \frac{400}{1000} = 40\%$

40 #

C.

完全立方數取法 ① 1,8 ② 2,4 ③ 3,9 $\Rightarrow$ 共 3 種.

$$\frac{3}{C_2^9} = \frac{3}{36} = \frac{1}{12}$$

$\frac{1}{12}$ #

D. ※餘式定理想法 $\Rightarrow$ 餘式為 0.

$f(x) = (x^2-5x+4)g_1(x) + x+2 \Rightarrow f(1)=3,\ f(4)=6.$

$= (x^2-5x+6)g_2(x) + 3x+4 \Rightarrow f(3)=13,\ f(2)=10.$

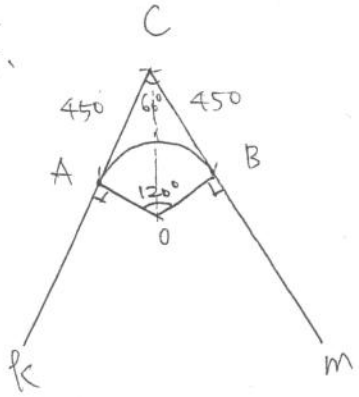
$\therefore$ 設 $f(x)$ 除以 x^2-4x+3 餘 $ax+b$

$\Rightarrow f(x) = (x^2-4x+3)g_3(x) + ax+b \Rightarrow f(1) = a+b = 3 \Rightarrow a=5,\ b=-2$

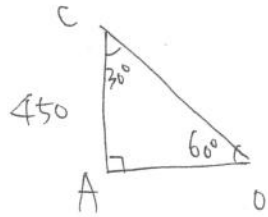
$f(3) = 3a+b = 13$

$5x-2$ #

E.



$\because A, B$ 為切點. 看 $\triangle CAO$

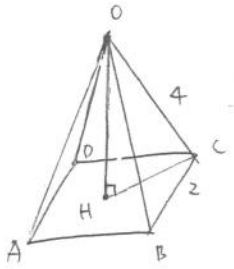


$\Rightarrow \overline{OA} = \frac{450}{\sqrt{3}}$

$\overset{\frown}{AB} = \frac{450}{\sqrt{3}} \times \left(\frac{120^\circ}{180^\circ}\times\pi\right) \div 544$

544 #

F.

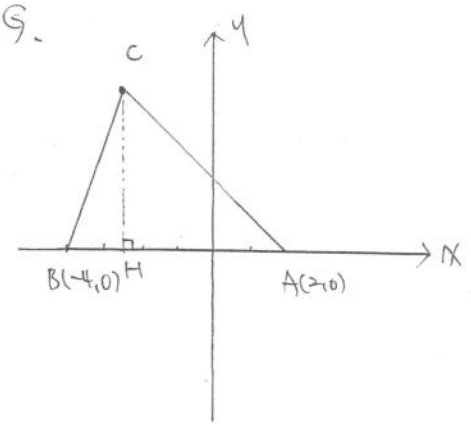


∵ ABCD為正方形 ∴ $\overline{CH} = \frac{\sqrt{2}}{2} \times 2 = \sqrt{2}$.

∴ $\overline{OH} = \sqrt{4^2 - (\sqrt{2})^2} = \sqrt{14}$

$\sqrt{14}$ #

G.



設 C 投影至 x 軸座標 H

∵ $\tan \angle BAC = \frac{8}{9} \Rightarrow \frac{\overline{HC}}{\overline{HA}} = \frac{8}{9}$

$\tan \angle ABC = \frac{8}{3} \Rightarrow \frac{\overline{HC}}{\overline{HB}} = \frac{8}{3}$ → $\overline{AH} : \overline{BH} : \overline{CH} = 9 : 3 : 8$

設 $\overline{AH} = 9t$, $\overline{BH} = 3t$, $\overline{CH} = 8t$

∵ $\overline{AB} = 6 = 12t \Rightarrow t = \frac{1}{2}$

∴ $C(\frac{-5}{2}, 4) \Rightarrow \overline{CD} = \sqrt{5^2 + 12^2} = 13$

13 #

H. 小正四面體邊長 : 大正四面體邊長 = 1 : 2

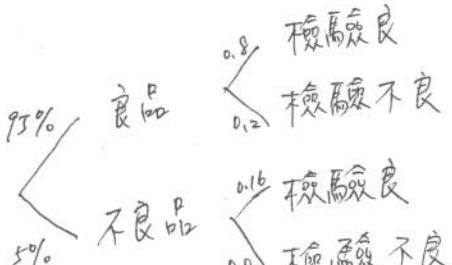
⇒ 小正四面體體積 : 大正四面體體積 = 1 : 8.

∵ 大正四面體體積 = 12. ∴ 小正四面體體積 = $12 \times \frac{1}{8} = \frac{3}{2}$.

八面體體積 = 大正四面體體積 − 4 × 小正四面體體積 = 6

6 #

I.



∴ 檢驗為良品之機率 = 95% × 0.8 + 5% × 0.16

= 76.8%

故 $P(\text{不良品} \mid \text{檢驗良}) = \frac{5\% \times 0.16}{76.8\%} = \frac{8}{768} \doteq 0.01$

0.01 #

J. $C_2^7 C_2^5 C_3^3 = 210$

↑ 甲隊 ↑ 乙隊 ↑ 第三隊

210 #