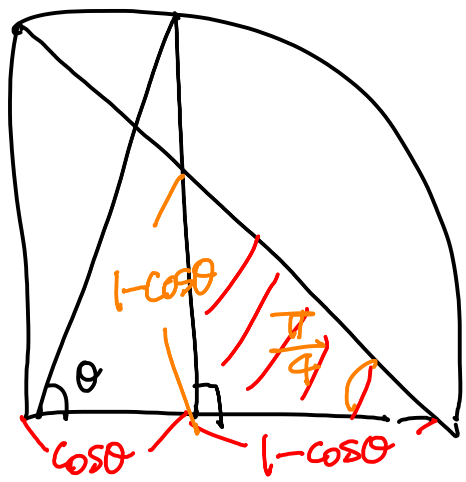
#14.

by 퓨이2



$$S(\theta)=\frac{1}{2}(1-\cos\theta)^2$$

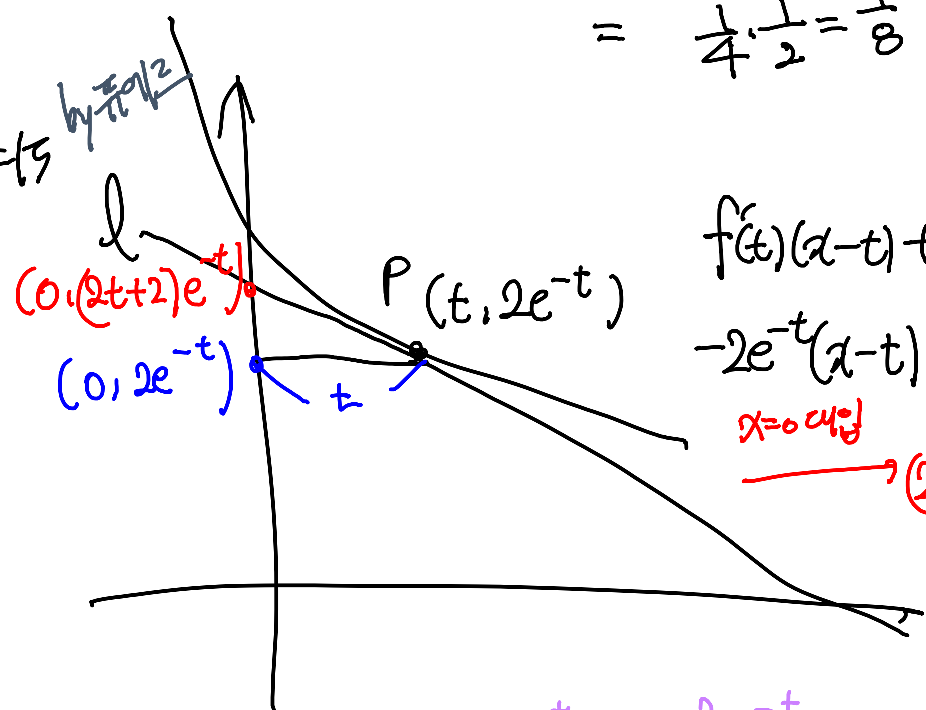
$$\lim_{\theta\to 0}\frac{1}{2}\frac{(1-\cos\theta)^2}{\theta^4}$$

$$=\lim_{\theta\to 0}\frac{1}{2}\left(\frac{1-\cos\theta}{\theta^2}\right)^2$$

$$=\lim_{\theta\to 0}\frac{1}{2}\left(\frac{\sin^2\theta}{\theta^2(1+\cos\theta)}\right)^2$$

$$=\frac{1}{4}\cdot\frac{1}{2}=\frac{1}{8}$$ ①

#15 by 퓨이2



$$f'(t)(x-t)+f(t)=l$$

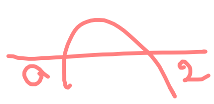
$$-2e^{-t}(x-t)+2e^{-t}=y$$

x=0 대입

$$\rightarrow (2t+2)e^{-t}=y$$

$$\therefore S(t)=\frac{1}{2}t\cdot 2te^{-t}=t^2e^{-t}$$

$$S'(t)=(2t-t^2)e^{-t}$$ $\therefore t=2\rightarrow$ ④



#16.

낯선표현

by 퓨어리

$\cdot$	$\vec{a}$	$\vec{b}$	$\vec{c}$
$\vec{a}$	2	1	$-\sqrt{2}$
$\vec{b}$	1	2	0
$\vec{c}$	$-\sqrt{2}$	0	2

$|\vec{a}| = |\vec{b}| = |\vec{c}| = \sqrt{2}$

$$|\overrightarrow{AB}|^2 = (\vec{b}-\vec{a})^2$$
$$= \vec{b}^2 - 2\vec{a}\cdot\vec{b} + \vec{a}^2$$
$$= 4 - 2 = 2$$

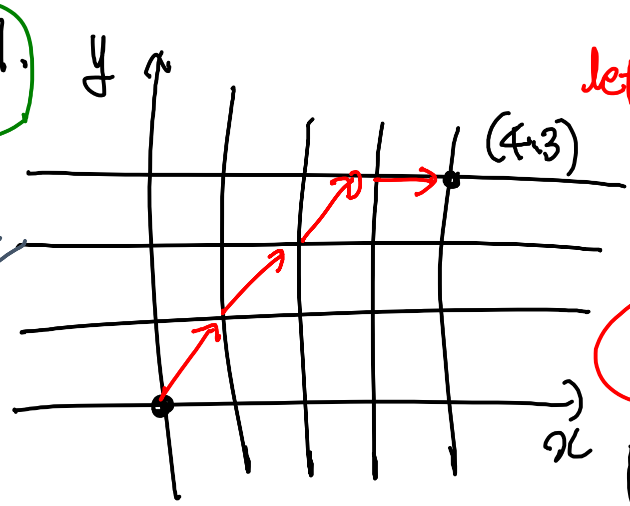
$$|\overrightarrow{AC}|^2 = (\vec{c}-\vec{a})^2 = 4 - 2\vec{a}\cdot\vec{c}$$
$$= 4 + 2\sqrt{2}$$

$$|\overrightarrow{BC}|^2 = (\vec{c}-\vec{b})^2 = 4$$

$\therefore\ \overline{AB} < \overline{BC} < \overline{AC}$ ②

#17.

by 퓨어리



let $\nearrow : c$, $\rightarrow : a$, $\uparrow : b$

$k = 4 \sim 7$

$k = 4$

$$P(X=k) = \frac{1}{N}\ \frac{4!}{3!}$$

$$P(X=k+1) = \frac{1}{N}\ \frac{5!}{2!\,2!}\ (\uparrow\uparrow\rightarrow\rightarrow\nearrow\ 4열)$$

$$P(X=k+2) = \frac{1}{N}\ \frac{6!}{3!\,2!}^{60}\ (\nearrow\rightarrow\rightarrow\rightarrow\uparrow\uparrow\ 4열)$$

$$P(X=k+3) = \frac{1}{N}\ \frac{7!}{4!\,3!}\ (\rightarrow\rightarrow\rightarrow\rightarrow\uparrow\uparrow\uparrow\ 4열)$$

② 193

$\therefore\ \frac{1}{N}\cdot 129 = 1 \quad \therefore\ N = 129$

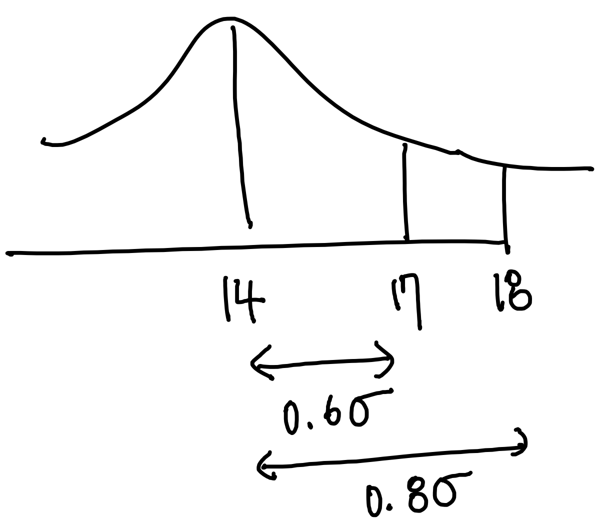
#18. by 퓨어르

(가) $f(10) > f(20)$ $\rightarrow$ $|m-10| < |m-20|$

(나) $f(4) < f(22)$ $\rightarrow$ $|m-22| < |m-4|$

(본인은 $\frac{10+20}{2}=15$, $\frac{4+22}{2}=13$, $13 < m < 15$

$\therefore m = 14$ 로 결론냄)

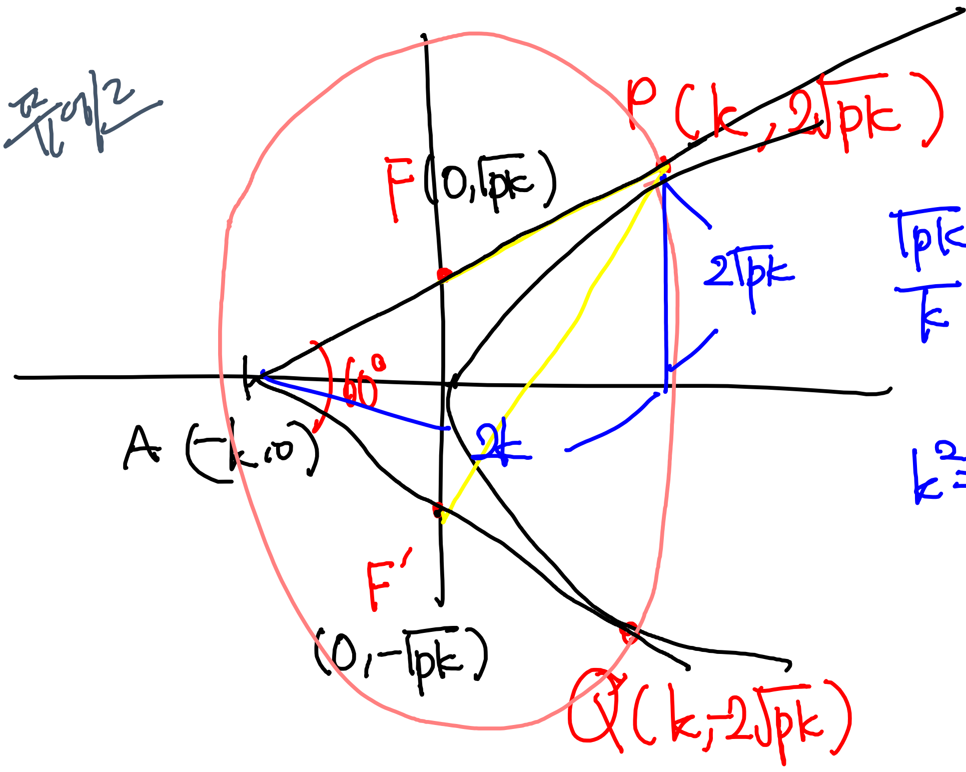


$\therefore 0.288 - 0.226$

$= 0.062$ = ③

#19

by 푸에르



$\frac{\sqrt{pk}}{k} = \frac{1}{\sqrt{3}}$

$k^2 = 3pk$

$k = 3p$

$k + p = 8$

$\overline{FP} + \overline{F'P} = 4\sqrt{3} + 12 = \sqrt{k^2 + pk} + \sqrt{k^2 + 9pk}$

$= \sqrt{12}\,p + 6p \rightarrow p = 2$

Tip

* $y^2 = 4px$ 위의 점 $(a, 2\sqrt{pa})$ 에서의 접·방은

반드시 $(-a, 0)$를 지남

pf) $2yy' = 4p$, $y' = \frac{4p}{2y} = \frac{2p}{y}$

$y = \frac{\sqrt{p}}{\sqrt{a}}(x - a) + 2\sqrt{pa}$ ↓ $(x = -a)$ 대입

$0 = -2\sqrt{ap} + 2\sqrt{pa}$

* 다른 pf) 도 있음

(by 퓨에르)

#20. $f(x)= e^{-x}\int_0^x \sin(t^2)\,dt$ ※ $f(0)=0$

ㄱ. $f(\sqrt{\pi})= \underbrace{e^{-\sqrt{\pi}}}_{+}\underbrace{\int_0^{\sqrt{\pi}} \sin(t^2)\,dt}_{+}$ $\therefore f(\sqrt{\pi})>0$

A

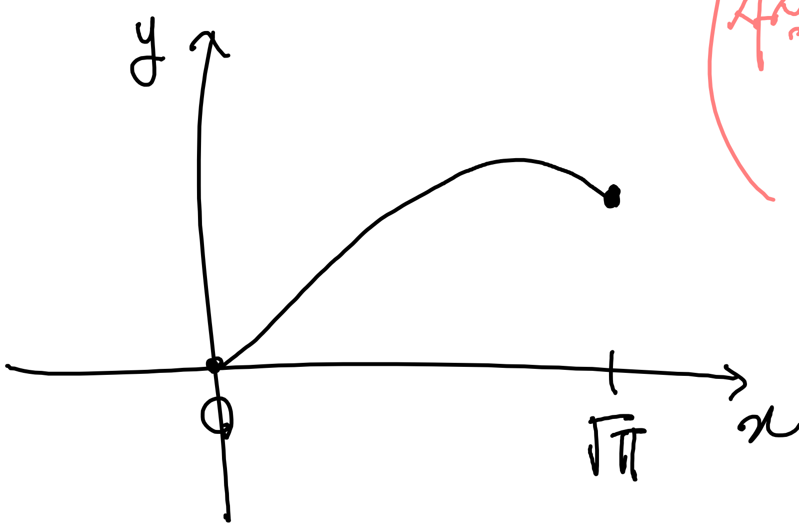
$\sin(t^2)$ 적분은 모르겠지만

$0 \le t < \sqrt{\pi}$ 에서 $0 \le \sin(t^2)$

ㄴ. $f'(x)= -e^{-x}\int_0^x \sin(t^2)\,dt + e^{-x}\sin(x^2)$

$f'(0)=0$, $f'(\sqrt{\pi}) = -A < 0$

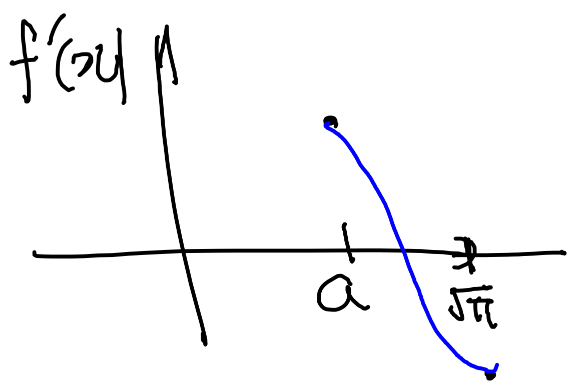
(사실 이그림으로 다 풀림)



$\dfrac{f(\sqrt{\pi})-f(0)}{\sqrt{\pi}-0} = f'(a) > 0$ 인 $a \in (0,\sqrt{\pi})$

ㄷ. $f'(a)>0$ 인 $a \in (0,\sqrt{\pi})$ 인데

$f'(\pi)<0$ 이므로



$f'(b)=0$ 인 $b \in (a,\sqrt{\pi})$

⑤

#26.
(by 퓨어리)

1 2
3 4

1 2
3 4

전체 : ${}_4C_2 \times {}_4C_2 = 36$

if 값	
12	12
13	12
14	14, 23
23	14, 23
24	24
25	25

총 8가지 $\therefore \frac{8}{36} = \frac{2}{9} = 11$

#27.
(by 퓨어리)

$a+b+c=7$

$2^{a+2b} = 8$의 배수
$= 2^3 \cdot k$ (k는 자연수)

if $a=0,\ b\ge 2$
$b'+c=5 \quad {}_2H_5=6$

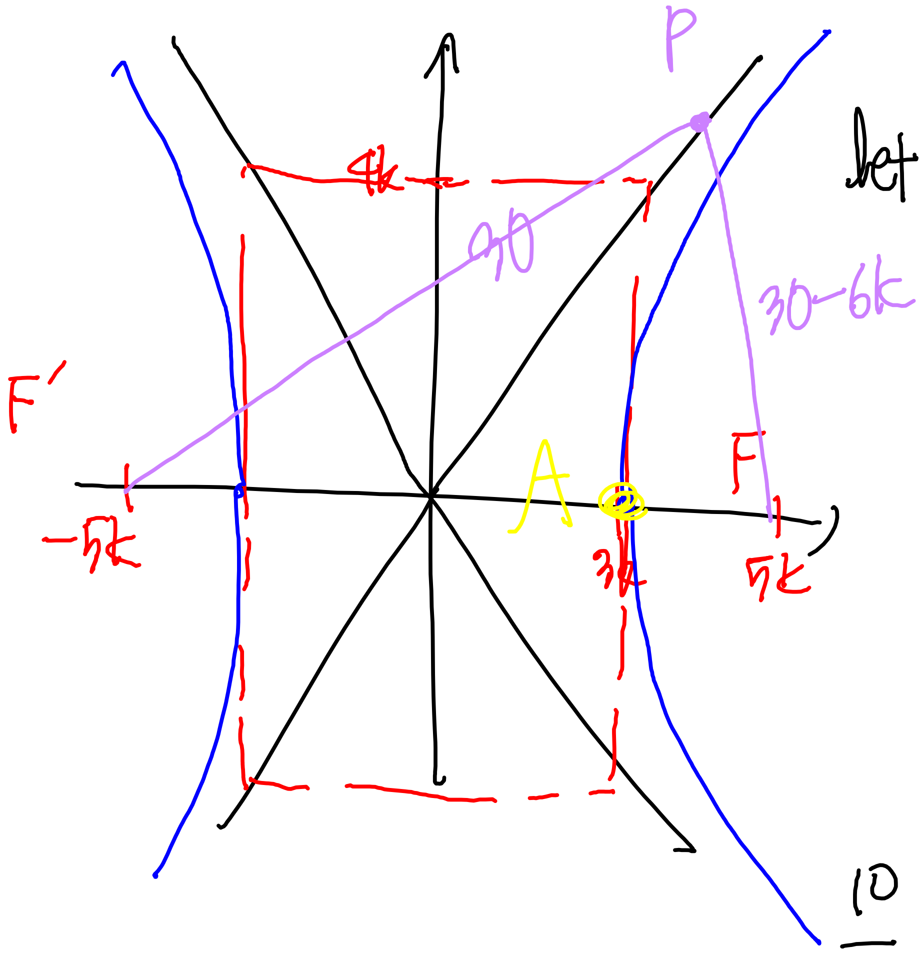
$a=1,\ b\ge 1$
$b'+c=5 \quad {}_2H_5=6$

$a=2,\ b\ge 1$
$b'+c=4, \quad {}_2H_4=5$

$a=3,4,5,6,7 \rightarrow b\ge 0$
$\therefore a'+b+c=4 \quad {}_3H_4=15$

$\therefore 32$

#28. (by 휴이드)



점근선 $y = \pm\frac{4}{3}x$

let $a = 3k$, $b = 4k$

$16 \le 30 - 6k \le 20$

$-14 \le -6k \le -10$

$\frac{5}{3} \le k \le \frac{7}{3}$

$\frac{10}{3} \le \overline{AF} = 2k \le \frac{14}{3}$

$\therefore 2k = 4 \quad k = 2$

$6k = 12$