

2015 昭和大医工期

($f(x)$ の最大値) < ($g(x)$ の最小値)

$$\Leftrightarrow a - 1 < 3$$

$$\therefore \frac{a-4}{4}$$

④

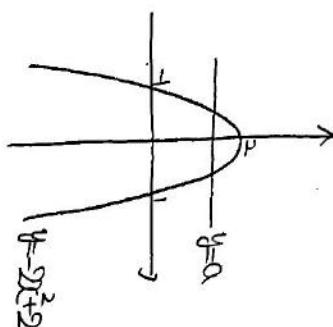
(1)

$$f(x) - g(x)$$

$$= x^3 + 2x + a - (-x^3 + 2x + 2)$$

$$= 2x^2 + a - 2 < 0$$

$$\Leftrightarrow a < -2x^2 + 2 \cdots ①$$



$$\frac{1}{4}\pi \leq x + \frac{\pi}{3} \leq \frac{3}{4}\pi$$

$$\frac{1}{3}\pi \leq x + \frac{\pi}{3} < \frac{7}{3}\pi$$

$$\frac{1}{4}\pi \leq x + \frac{\pi}{3} \leq \frac{3}{4}\pi, \\ \frac{1}{3}\pi \leq x + \frac{\pi}{3} < \frac{7}{3}\pi$$

(2)

(2)

$$P_3 = \frac{4C_2 + 3C_2}{4C_2}$$

$$= \frac{1}{2}(m+1-1)m(m-1) + m$$

$$= \frac{9}{21} = \frac{3}{7}$$

(3)

$$P_n = \frac{4C_2 + nC_2}{(n+4)C_2}$$

$$\Leftrightarrow 10^n < 6^{100} < 10^m$$

$$= 100 \log_{10} 6$$

$$= \frac{1}{2} \{ m^2 + (m-1)m + (m-2)(m-1) \}$$

$$= \frac{1}{2}(k-1)k < 200 \leq \frac{1}{2}k(k+1)$$

(3)

(4)

(4)

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200番目は20番目の10番目

$\therefore (10, 11)$

群	数	級数	累積級数
① (1,1)	1	1	1
② (1,2), (2,1)	2	3	3
③ (1,3), (2,2), (3,1)	3	6	6

$$\Leftrightarrow (k-1)k < 400 \leq k(k+1)$$

$\therefore k=20$

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$$C_1 + C_2 + \dots + C_{200}$$

$$= \sum_{k=1}^{19} t^k (k+1)(k+2)$$

$$+ \sum_{t=1}^{19} t(21-t)$$

$$= \frac{1}{6} \cdot \frac{1}{4} \cdot 19 \cdot 20 \cdot 21 \cdot 22$$

$$+ 21 \cdot \frac{1}{2} \cdot 10 \cdot 11 - \frac{1}{6} \cdot 10 \cdot 11 \cdot 12$$

$$= \frac{8085}{14}$$

[3]

(1)

$$(x^2+6x+9) = -x^2+11x+2$$

(2)

$$\cos \angle AOB = \frac{\overrightarrow{OA} \cdot \overrightarrow{OB}}{|\overrightarrow{OA}| |\overrightarrow{OB}|}$$

$$= \frac{12}{\sqrt{15} \cdot \sqrt{21}}$$

$$(3) f(x) = \frac{(x^2+2)(x^2+3)+5}{x+2}$$

[4]

$$= x^3 + 3x^2 + \frac{5}{x+2}$$

$$= x^2 + 2 + \frac{5}{x^2+2} + 1$$

$$\geq 2\left(\sqrt[3]{2}\right)\frac{5}{\sqrt[3]{2}} + 1$$

$$= 2\sqrt[3]{5} + 1$$

$$(x^2=15-20 \text{ は誤り})$$

$$= \frac{12}{\sqrt{15} \cdot \sqrt{21}}$$

$$= \frac{2\sqrt{6}}{7}$$

(1-3)

$$\Delta OAB$$

$$= \frac{1}{2} \sqrt{|\overrightarrow{OA} \cdot \overrightarrow{OB}|^2 - (\overrightarrow{OA} \cdot \overrightarrow{OB})^2}$$

$$= \frac{1}{2} \sqrt{14 \cdot 21 - 144} = \frac{5}{2}\sqrt{6}$$

$$(2) \frac{1}{x} \text{ の真似書き}$$

を確立

$$m^2(x^2+6x+9) = -x^2+11x+2$$

$$\Leftrightarrow (m^2+2)x^2 + (6m^2-4)x + 9m^2 - 2 = 0 \quad (2)$$

$$P = (3m^2-2)^2 - (m^2+2)(9m^2-2)$$

$$= -28m^2 + 8 = 0$$

$$= \lim_{x \rightarrow \pi} \frac{\sqrt{a-\cos x} - b}{x-\pi} \quad x-\pi=t$$

$$\therefore m = \frac{2}{\sqrt{15}} \quad m = \frac{\sqrt{15}}{15}$$

$$\text{図より求める範囲は } \frac{\sqrt{2}}{3} < m < \frac{\sqrt{14}}{7}$$

$$= \lim_{t \rightarrow 0} \frac{0-\cos t - b^2}{t^2(\sqrt{a-\cos t} + b)}$$

[4]

(1)

$$(1-1) \int_0^1 \frac{1}{1+x^2} dx$$

$$= \left[\tan^{-1} x \right]_0^1 = \frac{\pi}{4}$$

$$(1-2)$$

$$= \frac{1}{1+x^2} dx$$

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