****

2019

BAC2018-2019



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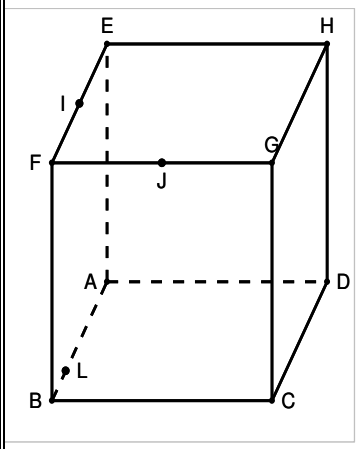
03 1

05

$(A;AB;AD;AE)$ 1 ABCDEFGH

L $[FG]$ $[FE]$ J I

$4x-4y+3z-3=0$ π $\{(A;1),(B;3)\}$



$\left(\frac{1}{4};0;0\right)$ $\left(\frac{3}{4};0;0\right)$ $\left(\frac{3}{2};0;0\right)$ L 1

(GFA) (LEJ) (GLE) π 2

(FB) π I 3

$\left(1;0;\frac{1}{3}\right)$ $\left(1;0;\frac{1}{5}\right)$ $\left(1;0;\frac{1}{4}\right)$ M

B M N (FB) (LE) 4

(IM) (LE) (IM) (LE)

$\frac{1}{24}$ $\frac{1}{48}$ $\frac{1}{36}$ FIJM 5

04

u_0 $\frac{3}{2}$ $u_{n\ 1}$ 1 $\sqrt{u_n\ \ 1}$ $(u_n)_n$

0 u_n 1 1 n 1

(u_n) 2

t_n $\ln(u_n\ \ 1)$ $(t_n)_n$ 3

n u_n n t_n $\frac{1}{2}$ $(t_n)_n$

$\lim_n (u_n)$ $\lim_n (t_n)$

P_n t_0 t_1 ..... t_n

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04

2cm $(O;u;v)$

1 $\frac{z-4}{z}=i$

2 $z^2-2z+4=0$

3 $a=2$ $b=4$ $a'=2i$ $d=2+2i$ A B A' D

ODB $\frac{d-b}{d}$

4 E F $e=1-i\sqrt{3}$ $f=1+i\sqrt{3}$

$OEAF$

5 A (C) A' (C') 2

2 O r $+\frac{\pi}{2}$

E E' r e' E' E' (C')

E E' D $e-d=\left(\sqrt{3}+2\right)(e'-d)$

6 D D' r $EE'D'$

07

C $f(x)=1-\frac{\ln x^2}{x}$ $-\{0\}$ f (O,i,j)

1 f

2 $f(-x)+f(x)$

3 $\alpha\in]-1,-0.5[$ $f(x)=0$

4 C $A(0;1)$ d C

5 C d d

6 $f(x)=mx+1$ m

7 C' $h(x)=1+\frac{\ln x^2}{|x|}$ * h

C' h h

8 C $A(\alpha)=\frac{\alpha^2}{4}cm^2$

$A(\alpha)$ $f(x)=0$ α y=1 $x=\alpha$ x=-1

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4cm $(O;u;v)$

$z_A=-i$ $z_B=e^{\frac{5\pi}{6}i}$ A B

1 z_A z_B

2 R O $\frac{-2\pi}{3}$ C B R

R

3 $z_C=e^{\frac{\pi}{6}i}$ z_C C

C B A (Γ) O

$\frac{z_C-z_A}{z_B-z_A}$ ABC

(E) M(z) $iz=1+e^{i\theta}$ θ θ

04

$(O;i;j;k)$ (P)

$x-3y+z-3=0$ A(2;−1;2) B(2;0;1) C(0;−3;−2) S(−1;1;2)

1- B (P)

2- $\begin{cases}x=t+2\\y=t-1\\z=2t+2\end{cases}$ $t\in$ (Δ) A C

(Δ) (P)

ABC AB.BC

3 (Δ) B (Q)

(Q) S (d)

(Q) S B

4 SABC $2x+3y+3z-7=0$ (SAB)

SAB (SAB) C

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3 5 $(n \quad 2)$ n

1

$p(n)$ $\dfrac{n^2 \quad n \quad 26}{(n \quad 8)(n \quad 7)}$ 2

$\lim\limits_{n} p(n)$

$30DA$ $n \quad 4$

$40DA$

$5DA$

X

X

07

$f(x)=\ln\left(4e^{x}+e^{-x}\right)-2\ln 2$ f

(O,i,j) (C_f)

$\lim\limits_{x\to+\infty} f(x)$ $\lim\limits_{x\to-\infty} f(x)$ 1

$f'(x)=\ln\left(4e^{2x}-1\right)-\ln(4e^{2x}+1)$ x

f $f'(x)$

$(+\infty)$ (C_f) $y=x$ (Δ) 2

$f(x)=-x-2\ln 2+\ln\left(4e^{2x}+1\right)$ x

$(-\infty)$ (C_f) (Δ')

$f(x)=\ln\left(\dfrac{5}{4}\right)$ 3

(C_f) (Δ') (Δ) 4

(C_g) $g(x)=f(-|x|)$ g II

g 1

(C_g) (C_f) (C_g) 2

$g(x)=m+2$ m 3

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03 2

05

$(O;u,v)$

$z_C=\sqrt{3}+i$ $z_B=-\sqrt{3}+i$ $z_A=-2i$ C B A

z_C z_B z_A 1

C B A (γ)

(γ) C B A

ABC $\frac{z_B-z_A}{z_C-z_A}$ 2

$\frac{\pi}{3}$ A r 1

r O $-\sqrt{3}-i$ O'

r (γ) (γ') (γ) $[O'C]$

B A (γ') (γ)

04

$C(1;0;1)$ $B(3;1;0)$ $A(1;0;-2)$ $(O;i;j;k)$

. B A (S) **1**

$\begin{cases}x+2z-3=0\\y+z-1=0\end{cases}$ $M(x;y;z)$ **2**

B $u(-2;-1;1)$ (Δ)

(Δ) A (P) 3

(Δ) (P) 4

(S) (Δ) (Δ) A

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$BG = \frac{1}{1+e^t}BC$ $\{(B,e^t),(C,1)\}$ G t 5

$f(t) = \frac{1}{1+e^t}$ f

$[BC]$ t G

04

1 1 0 0 1 5 1 1 1 0 1 5

3

1

B A

3 D 3 C

3 F

X **2**

X

X

07

$g(x) = -2x^3 + x^2 - 1$ g I

g 1

$-0,7$ α $-0,6$ α $g(x) = 0$ 2

$g(x)$ 3

$f(x) = \left(1 + x + x^2 + x^3\right)e^{-2x+1}$ f II

$\|j\| = 1cm$ $\|i\| = 2cm$ (O, i, j) (C_f)

1 x x^2 x^3 x 1 2

0 $f(x)$ $4x^3.e^{-2x+1}$ x 1

$\lim_{x\to+\infty} \frac{x^3}{e^x} = 0$ $\lim_{t\to+\infty} \frac{t}{e^t} = 0$

$\lim_{x\to+\infty} f(x)$ 2

$f'(x) = g(x).e^{-2x+1}$ x 3

f $\lim_{x\to-\infty} f(x)$

$f(\alpha)$ 5 (C_f) $f(0)$ $f(-1)$ $f(-1,1)$ 4

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C B A (O;u;v)

$z_C = 1 - i\sqrt{3}$ $z_B = 1 + i\sqrt{3}$ $z_A = 1 - \sqrt{3}$

$z_B^{2019} + z_C^{2019} = -2^{2020}$ z_C z_B z_A 1

$z_B^n - z_C^n = 2^{n+1} i \sin(\frac{n\pi}{3})$ n 2

ABC $\frac{z_A - z_C}{z_A - z_B}$ 3

GA BC $[BC]$ G z_G 4

$BM^2 + CM^2 = 12...(1)$ z M (S) 5

(S) (S) A

(S) G C B A

04

AD I D A

MD.MA MI^2 IA^2 M 1

MD.MA 0 M E 2

$(O;i;j;k)$

D 5;0;1 C 0;0;4 B 0;6;0 A 3;0;0

ABC ABC n 4;2;3 1

D ABC 2

H ABC D H 3

ABC D 4

E E H 5

04

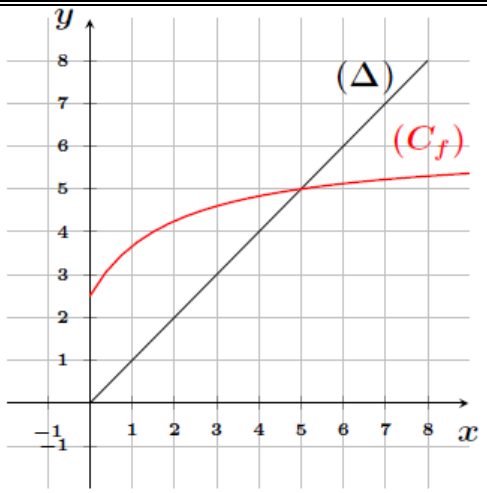
0; f $(o;i;j)$

y x ( ) (C_f) $f(x)$ $\frac{6x \quad 5}{x \quad 2}$

0; f I

u_0 1 (u_n) II

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$u_{n\ 1}$ $f(u_n)$ n

u_3 u_2 u_1 u_0 1

(u_n)

1 u_n 5 n 2

(u_n) 3

v_n $\frac{u_n\ 5}{u_n\ 1}$ n 4

(v_n)

(u_n) n u_n v_n

S_n $\frac{1}{u_0\ 1}$ $\frac{1}{u_1\ 1}$ .... $\frac{1}{u_n\ 1}$ S_n 5

07

2cm $(O;i;j)$

x	0	1	$+\infty$
g'(x)	+	0	-
g(x)	0 ↗		↘ ...

g I

$g(x)=\frac{2x^2}{x^2+1}-\ln(x^2+1)$ $[0;+\infty[$

$\lim_{x\to+\infty} g(x)=-\infty$ $g(1)$ 1

g

1,9 α 2 $g(\alpha)=0$ $[1;+\infty[$ α 2

$[0;+\infty[$ $g(x)$

(C_f) $f(x)=\frac{\ln(x^2+1)}{x}$ $x\neq 0$ $f(0)=0$ f II

$\lim_{x\to0}\frac{f(x)}{x}=1$ 1

$\lim_{x\to-\infty} f(x)$ $\lim_{x\to+\infty} f(x)=0$ f 2

$f'(x)=\frac{g(x)}{x^2}$ 0 x 3

f $[0;+\infty[$ f

0 (Δ) 4

$f(\alpha)$ $f(\alpha)=\frac{2\alpha}{\alpha^2+1}$ 5

(C_f) (Δ)

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03 3

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(u_n) $u_1 = \frac{1}{2}$ $u_{n+1} = \frac{n+1}{2n}u_n$ n

1 u_n 0 n

(u_n) (u_n)

2 $v_n = \frac{u_n}{n}$ n

(v_n) v_1

$u_n = \frac{n}{2^n}$ n

f $[1;+\infty[$ $f(x) = \ln x - x\ln 2$

f $+\infty$ (u_n)

04

1 $z^2 - 2z + 4 = 0$

1 1 $\left(\overline{z} + 2 + 2i\sqrt{3}\right)^2 - 2\overline{z} - 4i\sqrt{3} = 0$

2 $(O;i;j)$ D C B A

$z_A = 1 + i\sqrt{3}$ $z_B = -1 + 3i\sqrt{3}$ $z_C = -1 + i\sqrt{3}$ $z_D = -1 - i\sqrt{3}$

ABD z_{AB} z_{AD}

B $\frac{2\sqrt{3}}{3}$ $-\frac{\pi}{6}$ S

E C S z_E

ABED $z = \frac{z_B - z_E}{z_A - z_E}$

04

6 4

3

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X **1**

X

X

2

A_2 A_1 A_0

4 **3**

B_2 B_1 B_0

$P(B_0)$ $P_{A_2}(B_0)$ $P_{A_1}(B_0)$ $P_{A_0}(B_0)$

07

(O,i,j)

C_g $g(x)=\ln(x^2+x+1)-x$ g

$-\infty$ $+\infty$ g -1

g $g'(x)=\dfrac{x(1-x)}{x^2+x+1}$ $x\in$ -2

$]1.7,1.9[$ α $g(x)=0$ -4

$g(x)$ $x\in$ -5

C_f $f(x)=\ln(x^2+x+1)$ f

$-\infty$ $+\infty$ f -1

f

(T) C_f (T)

$\ln(x^2+x+1)=0$ -2

C_f

(T) C_f $f(\alpha)=\alpha$ 3

، $S(\alpha)=2\int_0^{\alpha}\dfrac{xdx}{x^2+x+1}+\int_0^{\alpha}\dfrac{dx}{x^2+x+1}$ -4

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(O,i,j,k)

$C(3,2,1)$ $B(-1,0,1)$ $A(1,2,2)$

1 $x-2y+2z-1=0$ C B A (Q)

2 (P) (BC) $z=1$ (P)

(Q) (P)

(BC)

3 (P) A $H(1,2,1)$

(AH) (BC)

–4 $\{(A,1),(B,1),(C,-1)\}$ G

$3\|MA+MB-MC\|=\|MA+MB+MC\|$ M (E)

04

$(O;i;j)$

1 $(z \quad 2 \quad 2i)(z^2 \quad 4z \quad 8) \quad 0$

$z_C \quad 2 \quad 2i$ $z_B \quad 2 \quad 2i$ $z_A \quad 2 \quad 2i$ $C \ B \ A$

2 $\frac{}{2}$ A

$z_D \quad 2 \quad 6i$ C D

$ABCD$

3 $(A,1);(B,\ 1);(C,\ )$ H

H

M 2

$MA^2 \quad MB^2 \quad 2MC^2 \quad 16$

04

1 $f(x)=\frac{1}{2}x+\frac{3}{2}$ $\mathbb{R}$ f

(C)

$\begin{cases} v_0=\frac{9}{2} \\ v_{n+1}=f(v_n) \end{cases}$ و $\begin{cases} u_0=-\frac{1}{2} \\ u_{n+1}=f(u_n) \end{cases}$ (v_n) (u_n)

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$y = x$ (C) 1

v_2 v_1 v_0 u_2 u_1 u_0

(v_n) (u_n) 2

$u_n < 3 < v_n$ n

$v_n = \frac{3}{2}\left(\frac{1}{2}\right)^n + 3$ $u_n = \frac{-7}{2}\left(\frac{1}{2}\right)^n + 3$ n 3

(v_n) (u_n)

$\lim v_n$ $\lim u_n$

(v_n) (u_n) 4

07

$g(x) = e^x - xe^x + 1$ g I

$-\infty$ g $\lim\limits_{x\to+\infty} g(x) = -\infty$ 1

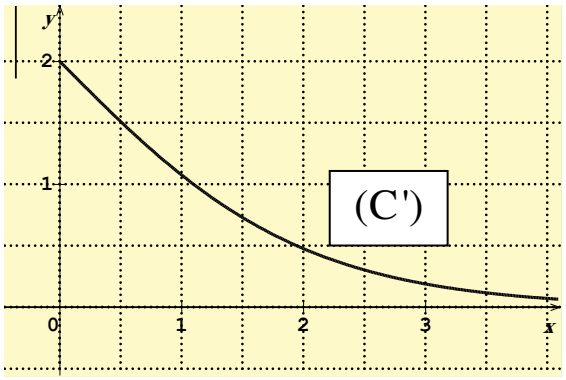
g

$1,2$ α $1,3$ α $g(x) = 0$ 2

g(x) x 3

(C) $f(x) = \frac{4x}{e^x + 1}$ f II

4cm 1cm (O, i, j)



$f'(x) = \frac{4g(x)}{(e^x + 1)^2}$ x 1

f (

$f(\alpha) = 4(\alpha - 1)$ 2

(C)

h (C') III

P M $h(x) = \frac{4}{e^x + 1}$ $[0; +\infty[$

$(0; h(x))$ $(x; 0)$ $(x; h(x))$ Q

M α OPMQ

α M

(PQ) (C') M (T)

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03 04

04

$u_{n+1}=\frac{2u_n-3}{4-u_n}$ n $u_0=2$ (u_n)

$u_{n+1}=a+\frac{b}{4-u_n}$ b a 1

$-1\le u_n\le 3$ n 2

$\lim\limits_{n\to+\infty} u_n$ (u_n) 3

$v_n=1-\frac{4}{u_n+1}$ (v_n) 4

(v_n)

$\Sigma_n=\frac{1}{v^2_0}+\frac{1}{v^2_1}+\quad+\frac{1}{v^2_n}$ n 5

05

3 10 7 13 20

B A

X A 3 1

A

X

$E(X)$ X

2

A

04

$z^2-i\sqrt{3}z-1=0...(E)$ 1

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$P(z)=3z^4-7i\sqrt{3}z^3-18z^2+7i\sqrt{3}z+3$ z 2

$P(e^{i\frac{\pi}{3}})=0$ $P(i\sqrt{3})=0$

$P(-\frac{1}{z})=\frac{1}{z^4}.P(z)$

$P(z)=0$ $e^{i\frac{2\pi}{3}}$ $\frac{\sqrt{3}}{3}i$

C B A $(O;u;v)$ 3

$e^{i\frac{2\pi}{3}}$ $3e^{i\frac{\pi}{3}}$ $e^{i\frac{\pi}{3}}$ C B A

D $OD=OA+OC$ D

E (OD) (BD) A

E

07

$g(x)=\ln(e^{2x}-e^x+\frac{1}{2})-2x$ g I

$g(x)=\ln(1-e^{-x}+\frac{1}{2}e^{-2x})$ x 1

g 2

$g(x)$ x $g(-\ln 2)$ 3

G g G 4

G

(C_f) $f(x)=\ln\left(2e^{2x}-2e^x+1\right)-\ln 2$ f II

$\lim_{x\to+\infty}f(x)$ $\lim_{x\to-\infty}f(x)$ 1

(D) (C_f) $+\infty$ (D) (C_f)

f f' $f'(x)=e^{x-f(x)}(2e^x-1)$ 2

f $f'(x)$

0 (C_f) (Δ)

(C_f) (Δ) (C_f) α 3

(C_h) $h(x)=\ln(\frac{1}{2}e^{2x}-e^x+1)$ h 4

(C_f) (C_h) $h(x)=f(x-\ln 2)+\beta$ β

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05

$f(x)=\frac{x^2}{2x-1}$ $\left]\frac{1}{2};+\infty\right[$ f

$f(x)\geq 1$ $x\geq 1$ 1

n $u_{n+1}=f(u_n)$ $u_0=2$ (u_n) 2

$u_n\geq 1$ n

L (u_n) (u_n)

$v_n=\ln\left(\frac{u_n-1}{u_n}\right)$ (v_n) 3

(v_n)

$u_n=\frac{1}{1-\left(\frac{1}{2}\right)^{2^n}}$ n v_n

04

z^2 $\sqrt{3}z$ 1 0 1

(O,u,v) (2

B z_B z_A $\frac{\sqrt{3}}{2}$ $\frac{1}{2}i$ A

OBA

$\overline{3}$ O R (3

R

R A A' z_A

z M (T) (T) (4

$|iz \quad 2 \quad i|$ $|\overline{z} \quad 3i|$

04

$(O;i;j;k)$

$E(-9;-4;-1)$ $D(1;0;2)$ $C(0;4;2)$ $B(1;4;4)$ $A(-1;3;2)$

(ABC) C B A 1

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$\begin{cases} x = -2t + 1 \\ y = 3t - 4 \\ z = 2t \end{cases}$ $(t \in \quad)$ (Δ) 2

(P) (Δ) D

(P)

(P) (ABC)

(Δ') (ABC) (P) 3

$\begin{cases} x = \alpha \\ y = 3 + \alpha \\ z = 4 \end{cases}$ $(\alpha \in \quad)$

(ABC) (P) E

(Δ') E

07

$g(x) = (-x + 2)e^x - 2$ g

$1.5 < \alpha < 1.6$ α $g(x) = 0$ -1

$+\infty$ $-\infty$ g -2

g -3

$g(x)$ $x \in$ $g(0)$ -4

$x \to g(x) + 2$ F -5

$s(\alpha) = \int_0^{\alpha} g(x).dx$ -6

C_f $f(x) = \dfrac{x^2}{e^x - 1}$ $-\{0\}$ f

$+\infty$ $-\infty$ f -1

f $f(x) = \dfrac{1}{\dfrac{e^x - 1}{x} \times \dfrac{1}{x}}$ $f(x)$ -2

$f'(x) = \dfrac{xg(x)}{(e^x - 1)^2}$ $x \in \quad -\{0\}$ -3

f f' -4

$f(\alpha) = \alpha(2 - \alpha)$ -5

f C_f -6

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03 05

04

$]0;1[$ α

$U_{n+1}=\dfrac{(1+\alpha)U_n-\alpha}{U_n}$ و $U_0=2$ (U_n)

$U_n \geq 1$ n 1

(U_n) (U_n)

$V_n=\dfrac{U_n-1}{U_n-\alpha}$ (V_n) 2

α (V_n)

α n U_n α n V_n

$\lim\limits_{n\to+\infty} U_n$ 1

05

$P(z)=z^3+z^2-4z+6$ z $P(z)$

$\overline{P(z)}=P(\overline{z})$ z 1

$P(z)$ $1+i$ 2

$P(z)=0$ 3

C B A $(O;\vec{u},\vec{v})$

$z_C=\overline{z_B}$ $z_B=1+i$ $z_A=-1$

$z'=(1+i)z+i$ $M'(z')$ $M(z)$ S 1

S

AMM′ A M

z_n A M_n n 2

$M_{n+1}=S(M_n)$ n $M_0=O$

$z_n=(1+i)^n-1$ n

M_n A O n

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04

1 4 7

0 2

1

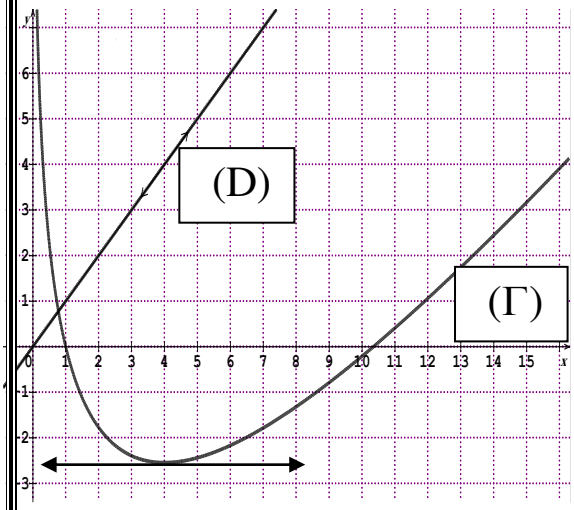
A

3 C 0 B

$P_A(B)$ $P(A\cap B)$ $P(A\cup B)=\frac{1}{3}$

3 X 2

X



07

u (Γ)

$(O;i;j)$

$u(x)=x-1-4\ln x$ $]0;+\infty[$

(Γ)

$+\infty$ $y=x$ (D)

(Γ)

4

α 1 $(O;i)$ (Γ)

$\lim\limits_{x\to+\infty}\frac{u(x)}{x}$ $\lim\limits_{x\to+\infty}u(x)$ $\lim\limits_{x\to0^+}u(x)$ $u'(4)$ $u(\alpha)$ $u(1)$ 1

$u'(x)$ $u(x)$ 2

$f(x)=\frac{e^{x-1}}{x^4}-(x-1)+4\ln x$ $]0;+\infty[$ f

$(O;i;j)$ f (C)

$f(x)=e^{u(x)}-u(x)$ $x\in]0;+\infty[$ 1

$\lim\limits_{x\to0^+}f(x)=+\infty$ $\lim\limits_{x\longrightarrow+\infty}f(x)=+\infty$

$f'(x)=u'(x)\left[e^{u(x)}-1\right]$ $x\in]0;+\infty[$ 2

f $x\in]1;4[\cup]\alpha;+\infty[$ $f'(x)>0$

(Γ) (C) $e^x-2x>0$ $x\in$ 3

$]0;15[$ (C)

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$(O;u;v)$

$\left(\overline{z}+\sqrt{3}+i\right)\left(z^2-2\sqrt{3}z+4\right)=0$ 1

$z_C=\overline{z_B}-2z_A \quad z_B=\sqrt{3}+i \quad z_A=\sqrt{3}-i$ $C \quad B \quad A$ 2

$z_B \quad z_A$

OAB $AB \quad OB \quad OA$

$-\frac{\pi}{3}$ O r C D z_D 3

$\left(\frac{z_G}{2\sqrt{3}}\right)^{1945}=\frac{z_G}{2\sqrt{3}}$ $\{(O;-1),(D;1),(B;1)\}$ G 4

$G \quad D \quad C$ $G \quad D \quad C \quad B \quad A$

AGC $OBGD$

04

$u_0=\frac{1}{8} \quad u_{n+1}=u_n(2-u_n)$ $(u_n)_{n\in}$

(Δ) 8cm $(O;i;j)$ 1

$f(x)=x(2-x)$ $[0;2]$ f (C) $y=x$

$u_3 \quad u_2 \quad u_1 \quad u_0$ 2

(u_n)

$0 \quad u_n \quad 1 \quad n$ 3

(u_n) (u_n)

$v_n=\ln(1-u_n) \quad n$ 3 4

(v_n)

$\lim_{n\to+\infty} u_n$ n u_n

$\lim_{n\to+\infty} P_n$ $P_n=(1-u_0)(1-u_1).....(1-u_n)$ P_n n 5

04

$(O;i;j;k)$

$C(0,1,1) \quad B(1,2,-2) \quad A(1,1,-2)$

P C‹B‹A 1

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P P $n = 3i + j$ 2

AC A Q 3

AB Q P Q

m $x^2 + y^2 + z^2 - 2x - 2my + 4z + 4 = 0$ $M(x, y, z)$ S_m 4

R_m I_m S_m m

AB I_m m

07

$$f(x) = 1 - \frac{1}{2}x - \frac{2}{e^x + 1}$$ f **I**

$(O; i, j)$ f (C_f)

f $1 - \frac{1}{e^x + 1} = \frac{1}{1 + e^{-x}}$ x

$\lim_{x \to +\infty} f(x)$ 1

$^+$ f $f'(x) = -\frac{1}{2}\left(\frac{e^x - 1}{e^x + 1}\right)^2$ $x \in$ **3**

$1 - \frac{2}{e^x + 1} \leq \frac{1}{2}x$ x

$\lim_{x \to +\infty}\left[f(x) - \left(1 - \frac{1}{2}x\right)\right]$ **4**

(C_f) $y = -\frac{1}{2}x + 1$ (Δ) **5**

x $-\frac{1}{e^x + 1}$ x $\ln(e^{-x} + 1)$ **6**

(C_f)

$x = 0$ $x = -1$ y=0

$u_{n+1} = 1 - \frac{2}{e^{u_n} + 1}$ n $u_0 = 1$ (u_n) Π

$u_{n+1} \leq \frac{1}{2}u_n$ $u_n > 0$ n **1**

(u_n) **2**

$\lim_{n \to +\infty} u_n$ $u_n \leq \left(\frac{1}{2}\right)^n$ $n \in$ **3**

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03 06

04

$(O;i;j;k)$

$x-2y-3z+3=0$ (P') (P)

$\begin{cases} x=-t \\ y=1+2t \quad t\in \\ z=5+3t \end{cases}$ (D) $x-y+z-4=0$

(P') (P) 1

(P') $x^2+y^2+z^2-6x+4y-4z+14=0$ (S) 2

$\begin{cases} x=11-5t' \\ y=7-4t' \quad t'\in \\ z=t' \end{cases}$ (Δ) (P') (P) 3

(Δ) (D) 4

04

n $v_0=2$ $u_0=1$ (v_n) (u_n)

$\frac{1}{2}<\alpha<1$ α $v_{n+1}=(1-\alpha)u_n+\alpha v_n$ $u_{n+1}=\alpha u_n+(1-\alpha)v_n$

$w_n=v_n-u_n$ (w_n) 1

w_1 w_0

$w_n=(2\alpha-1)^n$ n

(w_n)

$u_n\le v_n$ n 2

(v_n) (u_n)

l (v_n) (u_n)

l $u_n+v_n=3$ n

05

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$(O;u;v)$

D C B A

$z_D = -2\sqrt{3} + i\left(-2+\sqrt{3}\right)$ $z_C = 2\sqrt{3} + i\left(-2-\sqrt{3}\right)$ $z_B = 3+4i$ $z_A = 1$

D $\frac{2\pi}{3}$ A **r** B

(Γ) D B

$\frac{3}{2}$ B h A F

$[CD]$ F $z_F = -2i$ F

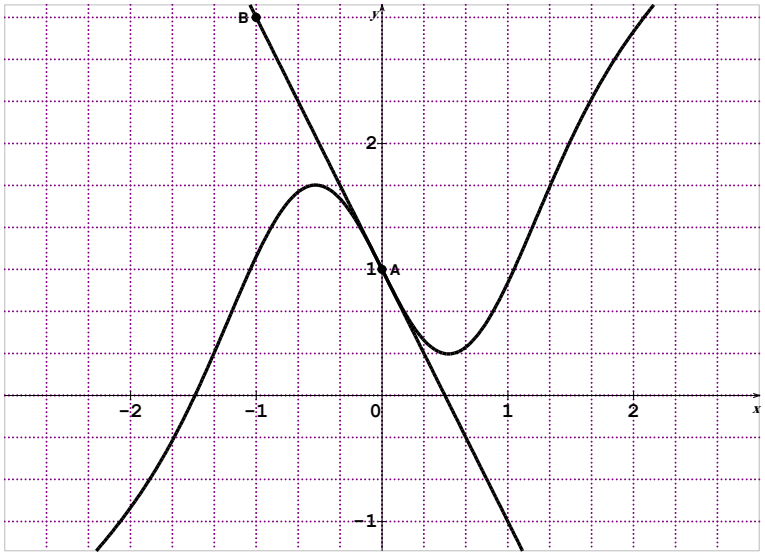
$$\frac{z_C - z_F}{z_A - z_F} = -i\sqrt{3}$$

F D C B A $[CD]$ (AF)

07

(C) $B(-1;3)$ $A(0;1)$ $(O;i;j)$

$a \in$ $f(x) = x+1+axe^{-x^2}$ f



(AB) A (C) 1

$f'(x) = 1-a(2x^2-1)e^{-x^2}$ x

A (C) (AB) a

x 2

$f'(x) = 1+3(2x^2-1)e^{-x^2}$ $f(x) = x+1-3xe^{-x^2}$

$f'(x)$ 0 $x \in]-\infty;-1]$ $f(x)$ 0 $x \in]-1;0]$

$y = x+1$ $x = 1$ $x = -1$ (C)

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04

2 2 1 1 0 5 10

1 0 1 1 0 3

1

A

C B

X 2

y x $\ln|x+y|$

X

X

05

C B A $(O;u;v)$

C' B' A' $z_C=4$ $z_B=2$ $z_A=-4$

$j=-\frac{1}{2}+i\frac{\sqrt{3}}{2}$ j $z_{C'}=jz_C$ $z_{B'}=jz_B$ $z_{A'}=jz_A$

$z_{C'}$ $z_{B'}$ $z_{A'}$ 1

$z_{C'}$ $z_{B'}$ $z_{A'}$ j

C' B' A' 2

C B A C' B' A' 3

$[C'A]$ $[C'C]$ $[A'C]$ P N M 4

MNP

04

$n\in$ $u_{n+1}=\frac{7u_n+2}{u_n+8}$ u_0 (u_n)

(u_n) u_0 1

u_2 u_1 $u_0=0$ 2

(u_n) $0\le u_n\le 1$ $n\in$

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$v_n = \dfrac{u_n + 2}{u_n - 1}$ $n \in$ (v_n) 3

(V_n)

$+\infty$ n (u_n) n u_n

$\pi_n = v_0 \times v_1 \times v_2 \times \ldots \times v_n$ $S = v_0 + v_1 + v_2 + \ldots + v_n$ π_n S_n

07

$f(x) = \dfrac{1}{x(1-\ln x)}$ x f

f (C_f)

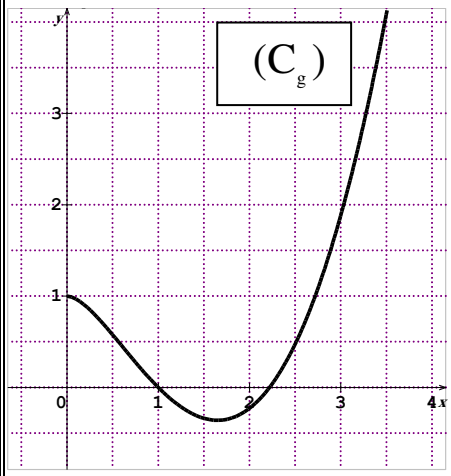
2cm $(O; i; j)$

$D_f =]0;e[\cup]e;+\infty[$ f 1 I

$\lim\limits_{x \xrightarrow{>} e} f(x)$ $\lim\limits_{x \xrightarrow{<} e} f(x)$ 2

$+\infty$ (C_f) $\lim\limits_{x \to +\infty} f(x)$

$x(1-\ln x) = x - x\ln x$ $\lim\limits_{x \xrightarrow{>} 0} f(x)$



$f'(x) = \dfrac{\ln x}{x^2(1-\ln x)^2}$ D_f x 3

$]0;1]$ f

$]e;+\infty[$ $[1;e[$

D_f f

$]0;+\infty[$ g II

(C_g) $g(x) = 1 - x^2(1-\ln x)$

$g(x) = 0$ 1

x	2,1	2,2	2,3	2,4
g(x)	–0,14	–0,02	0,12	0,28

$2,2 < \alpha < 2,3$ α $g(x) = 0$

$f(x) - x = \dfrac{g(x)}{x(1-\ln x)}$ D_f x 2

α 1 (C_f) $y = x$ (Δ)

$1;\alpha$ (C_g) g(x)

$1;\alpha$ x $f(x) - x \le 0$

(C_f) (Δ) $(O; i; j)$ 3

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04.5

$u_{n+1}=\frac{3}{4}u_n+\frac{1}{6}$ n $u_0=\frac{1}{12}$ (u_n) 1

(u_n) (u_n) $u_n=-\frac{7}{12}\left(\frac{3}{4}\right)^n+\frac{2}{3}$

$(O;u,v)$ 2

O $-\frac{\pi}{4}$ $z'=-\frac{\sqrt{2}}{2}(1-i)z$ T

$y=-x+1$ (Δ) $\arg(z-i)=-\frac{\pi}{4}$ M(z)

$(O;i;j;k)$ 3

A 2;1; 1 (d) $x+y-z+1=0$ (P)

u 1; 1;1

$x-y+z=0$ (P) O (Q)

04.5

$(z-1+\sqrt{3})(z^2-2z+4)=0...(E)$ z 1

z_2 $\mathrm{Im}(z_2)$ 0 $z_1\in$ (E) z_3 z_2 z_1 2

z_3 z_2

$z_2^{2018}-z_3^{2018}$

C B A $(O;u;v)$ 3

$z_C=1-\sqrt{3}i$ $z_B=1+\sqrt{3}i$ $z_A=1-\sqrt{3}$

ABC $\frac{z_A-z_C}{z_A-z_B}$

$\{(A,2);(B,1);(C,-1)\}$ G

$2MA^2+MB^2-MC^2=-3$ M

(C_g) $g(x)=x+\dfrac{2e^{-x}}{e^{-x}+1}$ f

2cm $(O;i;j)$

$\lim\limits_{x\to+\infty} g(x)$ $\lim\limits_{x\to-\infty} g(x)$ 1

$g'(x)=\dfrac{e^{2x}+1}{(e^{x}+1)^{2}}$ x 2

(Δ') (Δ) (C_g) 3

$(+\infty)$ $(-\infty)$ $y=x$ $y=x+2$

(Δ') (Δ) (C_g)

(C_g) 4

0 A (C_g) (T) 5

$g(x)+g(-x)=2$ x 6

$g(-2)$ $g(2)$ $g(-1)$ $g(1)$

(C_g) x

$g(x)$ $-2<\alpha<-1$ α

(C_g) (T) (Δ') (Δ) 7

$m.e^{x}+m-2=0$ m 8

h $h(x)=g\left(\dfrac{1}{x}\right)$ $]-\infty;0[\cup]0;+\infty[$ h 9

h

h

6 (C_h) A

$G(0)=\ln\dfrac{1}{4}$ g G 10

G 6

$\lim\limits_{x\to\alpha}\dfrac{G(x)-G(\alpha)}{x-\alpha}$

10 G

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05

$(O;u;v)$

$\left(z^2-2+i2\sqrt{3}\right)\left(z^2-8\sqrt{3}z+64\right)=0$ 1

$z_B=4\sqrt{3}+4i \quad z_A=4\sqrt{3}-4i$ B A 2

OAB $\frac{z_B}{z_A}$

$-\frac{\pi}{3}$ O R D $z_C=-\sqrt{3}+i$ C

D z_D

$\{(O;-1),(D;1),(B;1)\}$ G 3

G D C B A z_G G

$\|MB+MD-MO\|=\|MB-MG\|$ M

G D C $\frac{z_G-z_C}{z_D-z_C}$

H D G

$\frac{z_G-z_C}{z_D-z_C}$ z M

ACGF F 4

04

5 3 25

3 4 4

4 1 **I**

4

4

X 2

X X

04

$(O;i,j,k)$

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$x+y+z-3=0$ (P) $C(6;-2;-1)$ $B(6;1;5)$ $A(3;-2;2)$

AB.AC 1

(P) B A 2

(AC) A (P') 3

$\begin{cases} x=t \\ y=-2t+4 \\ z=-1+t \end{cases} :t\in$ (P') (P) (Δ) 4

(Δ) $D(0;4;-1)$ 5

$\frac{\pi}{4}rad$ BDC $ABCD$

(BCD) A BCD

07

$g(x)=x^2+1-2\ln x$ $]0;+\infty[$ g **I**

$]0;+\infty[$ $g(x)$ **2** g **1**

$f(x)=x+\frac{1}{x}(1+2\ln x)$ $]0;+\infty[$ f **II**

$(O;i,j)$ f (C_f)

$\lim\limits_{x\to+\infty} f(x)$ $\lim\limits_{x\xrightarrow{>}0} f(x)$ **1**

$f'(x)=\frac{g(x)}{x^2}$ $]0;+\infty[$ f f'

f

$+\infty$ (C_f) $y=x$ (Δ) **2**

(Δ) (C_f)

$0.5<\alpha<0.6$ α $f(x)=0$

$x\geq 1$ $A(x;2)$ (C_f) (T) **3**

(C_f) $B(e;e+\frac{3}{e})$ $x^2g'(x)-2xg(x)=0$

(C_f) (T) (Δ)

$]0;+\infty[$ f F x $(\ln x)^2$ **4**

$y=0$ $x=1$ $x=\alpha$ (C_f)

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03 08

05

4 4 4 4 3 3 3 2 2 1 10

A 1

$P(A)=\frac{1}{3}$

2

A X

X $P(X=1)=\frac{4}{9}$

04

$A(3;2;1)$ $B(3;5;4)$ $C(0;5;1)$

1 ABC

2 ABC $n(1;1:-1)$

3 ABC G

(ABC) G (Δ)

$S(2+t;4+t;2-t)$ $t\in$ $AS^2=AB^2$

F(4;6;0) FABC V

4 (BC) (FA)

5 M (S) $\|MG+MF\|=6$

(ABC) (S)

04

1 $z^2+z+1=0$ z

2 F D C B A $(O;i,j)$

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$z_F = \overline{z_D}$ $z_D = -2+2\sqrt{3}i$ $z_C = -2$ $z_B = \overline{z_A}$ $z_A = -\frac{1}{2}+\frac{\sqrt{3}}{2}i$

ABC F D C B A z_B z_A

$z'+2 = e^{-i\frac{\pi}{3}}(z+2)$ M'(z') M(z) $\Re$ 3

$\Re(D) = E$ $z_E = 1+\sqrt{3}i$ $\Re$

(EF) (ED) $\frac{z_F - z_E}{z_D - z_E}$

$z' = \frac{z - z_C}{z - z_E}$ z' E z 4

(Γ_1) z' z M (Γ_1)

.G z_G $\{(A,|z_A|);(B,|z_B|);(C,|z_C|)\}$ G 5

$\|MA+MB+2MC\| = \|MA+MB-2MC\|$ M (Γ_2)

$.(\Gamma_2)$ (Γ_2) C

07

$f(x) = \frac{x}{x-1} - \ln|x-1|$ $-\{1\}$ f

$(O;i;j)$ f (C_f)

$\lim_{x\longrightarrow 1} f(x)$ $\lim_{x\longrightarrow 1} f(x)$ $\lim_{x\to+\infty} f(x)$ $\lim_{x\to-\infty} f(x)$ 1

$f'(x) = \frac{-x}{(x-1)^2}$ f 2

f

$\alpha \in]4;5[$ $f(x) = 0$ 3

ω (C_f)

2 (Δ') (Δ) (C_f)

(C_f) (Δ') (Δ) $f(-8)$ $f(-4)$ $f(-1)$ $f(10)$ $f(6)$

m

$m(x-1) = 2x^2 - x - (x-1)\ln|x-1|$

$g(x) = e^{-x}\ln(e^x-1)$ $]0;+\infty[$ g 4

g $g'(x) = e^{-x}f(e^x)$ x

$\lim_{x\to+\infty} g(x) = 0$ $\lim_{x\longrightarrow 0} g(x)$

g (

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05

$.(O;i;j;k)$

$C(2;-2;0)$ $B(2;1;3)$ $A(1;2;3)$

1 C B A

2 $x+y-z=0$ $.(ABC)$

3 $E(-4;6;2)$ $D(2;0;2)$ $.(DE)$

4 $M(x;y;z)$ (S) $x(x-2)-y(2-y)+z(z-8)+14=0$

(S) Ω R

(DE) (S) H

(ABC) (S)

04

- I $(z+2)(z^2+2-2\sqrt{3}i)=0$

II $(O;u;v)$ A B C

$z_A=-2$ $z_B=-1-i\sqrt{3}$ $z_C=-z_B$

1 $|z_A-z_B|^2+|z_A-z_C|^2=|z_B-z_C|^2$ ABC

2 A B C

3 z_D D A O

ABDC

4 A B C

5 $M(z)$ $z\neq -2$ $M'(z')$ $z'=\dfrac{iz-\sqrt{3}+i}{z+2}$

M z' $\arg(z')=\dfrac{\pi}{2}+(AM;BM)$

04

$(U_n)_{n\in}$ $U_0=1$ $\ln U_1+\ln U_2=-3\pi$

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n U_n

$U_0 + U_1 + ... + U_n$ P_{n+1}

$\lim_{n\to+\infty}(P_{n+1})$ n P_{n+1}

$V_n = \ln(U_n)$ $(V_n)_{n\in}$ 2

$(V_n)_{n\in}$

$V_0 + V_1 + ... + V_n$ S_{n+1}

$\sin(S_{n+1}) = 0$ n S_{n+1}

n π_{n+1} $U_0 \times U_1 \times ..... \times U_n$ π_{n+1} 3

$\pi_{p+1} = e^{-6\pi}$ U_p

07

$g(x) = \frac{x}{x+1} - \ln(x+1)$ $]-1;+\infty[$ g (I

g 1

. $]-1;+\infty[$ $g(x)$ 2

$x \in]-1;0[\cup]0;+\infty[$ $f(x) = \frac{\ln(x+1)}{x}$ $f(0) = 1$ $]-1;+\infty[$ f (II

$(O;i;j)$ (C_f)

. $\lim_{x\to+\infty} f(x)$ $\lim_{x\to-1} f(x)$ 1

0 f $]-1;+\infty[$ f

$f'(0) = -\frac{1}{2}$ (C_f) (T)

$h(x) = f(x) + \frac{1}{2}x - 1$ $]-1;+\infty[$ h 2

$k(x) = x^2(f'(x) + \frac{1}{2})$ $k(x)$ $]-1;+\infty[$ $h'(x)$

k $k'(x) = \frac{x^2(x+2)}{(x+1)^2}$ $x \in]-1;+\infty[$

.(T) (C_f) $h(x)$ $h'(x)$

. (T) (C_f) 4

$f(x) = (\ln m)(x-2)$ $x > -1$ x m 5

. (E) m

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05

$z^2-(\sqrt{5}+2i)z+1+4i\sqrt{5}=0...(E)$ 1

$\Delta=-3(\sqrt{5}+2i)^2$ (E) $(\sqrt{5}+2i)^2$

$b=(\sqrt{5}+2i)(\frac{1-i\sqrt{3}}{2})$ $a=(\sqrt{5}+2i)(\frac{1+i\sqrt{3}}{2})$ (E)

$(O;u;v)$ 2

3 O (C)

$\sqrt{5}+2i$ Q

Q (C)

b a B A 3

(C) B A

. $OA+OB=OQ$

OAQB

B A

05

$B(1;-2;4)$ $A(1;1;0)$ $(0,i,j,k)$

$2x+y-z+3=0$ (P) $C(-1;0;1)$

(P) n 1

$AB=\alpha n$ α

n AB A (Q)

t' t $\begin{cases}x=1+2t'\\y=1-3t+t'\\z=4t-t'\end{cases}$ $(A;AB;n)$

(Q) (P) (Q)

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n' n $u(14;-11;17)$ (Q) (P) C 2

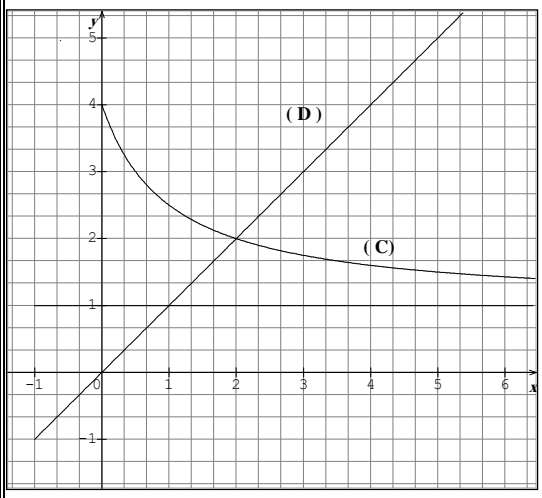
(Q)

(P) (AB) (D') 3

04

$\begin{cases} u_0 = 1 \\ u_{n+1} = f(u_n) \end{cases}$ (u_n) $f(x) = \dfrac{x+4}{x+1}$ $]-1;+\infty[$ f

$y = x$ (D) $[0;+\infty[$ f (C) 1



u_3 u_2 u_1 u_0

(u_n)

$1 \le u_n \le \dfrac{5}{2}$ n

$v_n = \dfrac{6-3u_n}{u_n+2}$ (v_n) 2

(v_n) $u_{n+1}+2$ $6-3u_{n+1}$

$-\dfrac{1}{3}$

(u_n) v_n u_n

07

(C_f) $f(x) = (ax^2+bx+c)e^x$ $\mathbb{R}$ f

1 (C_f) c b a I

A $A(2;-e^2)$ (C_f)

$\mathbb{R}$ $f(x) = (2x^2-7x+5)e^x$ II

$\lim\limits_{x\to-\infty} f(x) = 0$ 1

f $f'(x)$

0 (C_f) (d)

(d) (C_f) 2

$\mathbb{R}$ f $f(x) = 4e^x + 2f'(x) - f''(x)$ x $\in$ 3

$y = 0$ $x = 1$ $x = 0$ (C_f) 4

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04

. $(O;u;v)$

$(2\bar{z}-1+9i)(z^2-8z+32)=0$ 1

$z_\Omega = i$ $z_C = \frac{1}{2}+\frac{9}{2}i$ $z_B = \bar{z}_A$ $z_A = 4+4i$ Ω C B A 2

$\arg(\bar{z}-4+4i)^2 = \frac{\pi}{2}+2\pi k$ / $k \in$ $M(z)$ (Γ)

$z' = \frac{1}{2}(1+i)z+\frac{1}{2}+\frac{1}{2}i$ $M'(z')$ $M(z)$ S 3

$S(A)=C$ S

S (Γ) (Γ')

$A_{n+1} = S(A_n)$ $n \in$ $A = A_0$ A_n A_1 A_0 4

A_n z_n

$z_n - i = \left(\frac{\sqrt{2}}{2}\right)^n e^{i\frac{n\pi}{4}}(z_0 - i)$ n

A_2 A_{n+1} $\Omega A_n A_{n+1}$

04

2 1 6 A

4 B 4 4 2 2

4 2 1 0

B y A x

$x = y$ 1

x^y y x X 2

$P(X \le 4)$ $P(X=4)=\frac{5}{24}$ X

$\frac{209}{8}$ X

05

0; f $(O;i;j)$

y x ( ) (C_f) $f(x)$ $\frac{1}{4}x$ 3

0; f

$u_{n\ 1}$ $f(u_n)$ n u_0 0 (u_n)

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u_3 u_2 u_1 u_0 ( ) (C_f) 1

(u_n)

0 u_n 4 n 2

(u_n) 3

v_n $\ln(4 \quad u_n)$ n 4

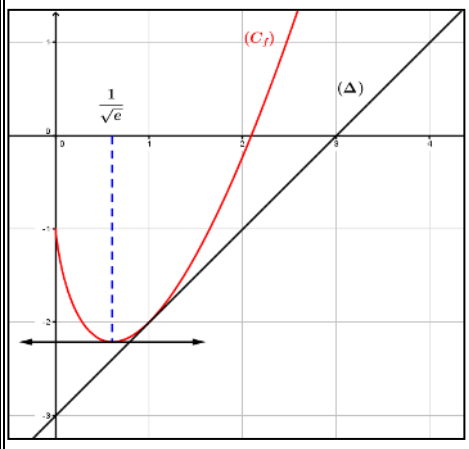
(v_n)

(u_n) n u_n v_n

P_n S_n n 5

P_n $(4 \quad u_0)$ $(4 \quad u_1)$ ..... $(4 \quad u_n)$ S_n v_0 v_1 ..... v_n

07



$g(x)=2x\ln x-x-1$ $]0;+\infty[$ g **I**

g (C)

(C) $(O;i;j)$

1 (C) (Δ) $\frac{1}{\sqrt{e}}$

1

g (Δ) $g'(1)$ $g(1)$ $g'\left(\frac{1}{\sqrt{e}}\right)$

$g(x)$ $g(\alpha)=0$ $2<\alpha<2,1$ α 2

$\begin{cases} f(x)=x^2(\ln x-1)-x \ ; x>0 \\ f(0)=0 \end{cases}$ $]0;+\infty[$ f **II**

$(O;i;j)$ (C_f)

f $\lim\limits_{x \xrightarrow{>} 0} \frac{f(x)}{x}=-1$ 1

O (C_f) (T)

f $f'(x)=g(x)$ $x \in]0;+\infty[$ $\lim\limits_{x\to+\infty} f(x)$ 2

$f(\alpha)$ $f(\alpha)=-\left(\frac{\alpha^2+\alpha}{2}\right)$ 3

(C_f) $y=-x$ (Δ') (Δ') 4

$f(3,55)$ 0 (C_f) (Δ')

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03 10

04

$z' = 2iz + 4 + 2i$ $M'(z')$ $M(z)$ T **1**

$z_\omega = 2i$ ω $\theta = \frac{\pi}{2}$ $k = 2$ T

M $\omega MM'$

$\alpha = -2\left(\sin\frac{2019\pi}{12} + i\cos\frac{2019\pi}{12}\right)$ α **2**

$\alpha^{2019} \in$ $\alpha = 2e^{-i\frac{5\pi}{4}}$ α

$u_{n+1} = \frac{2}{5}u_n + \frac{6}{5}$ n $u_0 = 7$ (u_n) **3**

(u_n) $u_n = 2\left[\left(\frac{2}{5}\right)^{n-1} + 1\right]$

05

$B(1;3;5)$ $A(-2;-1;3)$ $(O;i,j,k)$

$t \in$ $\begin{cases} x = 1+t \\ y = -2t \\ z = 3-6t \end{cases}$ (Δ) $D(2;-2;-3)$ $C(2;-0,5;-4)$

(AB) (Δ) (AB) 1

(AB) (Δ) (P) 2

(P) $n(2;-2;1)$

M (P) (Δ) M

(P) C (Δ) D 1

ABCD A ABC

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04

$(U_n$ 1

$\ln U_2 - \ln U_4 = 4 \quad \ln U_1 + \ln U_5 = -12$

n U_n U_0

$+\infty$ n S_n n S_n $S_n = U_0 + U_1 + ... + U_n$

$V_n = \ln U_n + \ln U_{n-1}$ n $(V_n$ 2

$(V_n$

$T_n^2 = 2^{2020}$ n $T_n = V_0 + V_1 + ... + V_n$

07.5

$2cm$ $(O;i;j)$

(C_g) $g(x) = \dfrac{3e^x - 1}{e^x + 1}$ g **I**

g 1

$g(x) + g(-x) = 2$ $x \in$ 2

$g(x)$ $g(-\ln 3)$ 3

(C_g) 4

(C_g) $y = x + \alpha$ α 5

(C_g) 6

$g(x) = a + \dfrac{be^{-x}}{e^{-x} + 1}$ b a 7

$x = 0$ $x = -3$ $y = 0$ (C_g) 8

(C_f) $f(x) = -x + 4\ln(e^x + 1)$ f **II**

$\lim\limits_{x \to +\infty} f(x) = +\infty$ $-\infty$ f 1

(C_f) $\lim\limits_{x \to +\infty} \left(f(x) - 3x\right) = 0$ $\lim\limits_{x \to -\infty} \left(f(x) + x\right) = 0$

(C_f)

$f'(x) = g(x)$ x 2

f $f'(x)$

(C_f) 3

m 4

$4\ln(e^x + 1) = x + m$ x

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04

$f(x)=\dfrac{-3}{x-4}$ $[1;3]$ f

$f(x)\in[1;3]$ $x\in[1;3]$ f 1

n $\begin{cases}u_0=2\\u_{n+1}=f(u_n)\end{cases}$ (u_n) 2

n $1<u_n<3$

(u_n) N (u_n)

$v_n=\dfrac{u_n-1}{u_n-3}$ N (v_n) 3

(v_n)

$S_n=v_0+v_1+.....+v_n$ n v_n

$3+2S_n=\frac{1}{27}$ n

04

5 3 U_1 3

U_3 U_2

( ) 3

(1

U_2 (2

(3

α α

5DA 10DA

α X

α X

05

z_0 2 z z^3 $2z^2$ 16 0 1

S $2,4$ $2i,4$ $2i$ S $2,4$ $2i,4$ $2i$ S $2,2$ $2i,2$ $2i$

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z_B 2 $2i$ z_A 2 $2i$ B, A 2

O O OAB

z $e^{i\frac{}{3}}z$ T 3

z z z $e^{i\frac{}{3}}z$ 4

z 2 i z $(\cos\frac{}{3})$ $i(\sin\frac{}{3})$ z $(\cos\frac{}{3}.\cos$ $\sin\frac{}{3}.\sin$ $)$ $i(\cos\frac{}{3}.\sin$ $\sin\frac{}{3}.\cos$ $)$

$\arg(z$ $z_A)$ $\arg(iz$ $z_B)$ M (T) 5

iz_B A, B AB AB (AB)

07

$g(x) = -2\ln(x+1) + \frac{x}{x+1}$ $]-1;+\infty[$ g

g 1

g $g'(x)$

$]-0,72;-0,71[$ α 0 $g(x) = 0$ 2

$]-1;+\infty[$ $g(x)$

$f(0) = 0$ $\begin{cases} f(x) = \frac{x^2}{\ln(x+1)}; x > -1; x \neq 0 \\ f(x) = (1+x)e^{-x-1}; x \leq -1 \end{cases}$ f

$(O; i; j)$ f (C_f)

f 1

1 f 2

$f'(x) = \frac{-x.g(x)}{\ln^2(x+1)}$ $]-1;+\infty[- \{0\}$ x 3

$]-\infty;-1[$ $f'(x)$

f

0 (C_f) (T) 4

1 (T)

(C_f)

$f(-2;5)$ $-6;7$ $f(3)$ $6;5$ $f(\alpha)$ $-0;41$

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