Ενότητα 35

(2) (α) $\int_{-1}^{0} x e^{x} \, dx =$

$= \int_{-1}^{0} x (e^{x})' \, dx =$

$= (xe^{x})_{-1}^{0} - \int_{-1}^{0} e^{x} \cdot 1 \, dx =$

$= 0e^{0} - (-1)e^{-1} - \int_{-1}^{0} e^{x} \, dx =$

$= \frac{1}{e} - (e^{x})_{-1}^{0} = \frac{1}{e} - (e^{0} - e^{-1}) =$

$= \frac{1}{e} - 1 + \frac{1}{e} = \frac{2}{e} - 1$

(β) $\int_{0}^{\pi} x \, \text{ημ}x \, dx = \int_{0}^{\pi} x \cdot (-\text{συν}x)' \, dx =$

$= (-x\,\text{συν}x)_{0}^{\pi} - \int_{0}^{\pi} -\text{συν}x \cdot 1 \, dx$

$= -(x\,\text{συν}x)_{0}^{\pi} + \int_{0}^{\pi} \text{συν}x \, dx$

$= -(\pi\,\text{συν}\pi - 0\,\text{συν}0) + (\text{ημ}x)_{0}^{\pi} =$

$= -(-\pi) + \cancel{\text{ημ}\pi} - \cancel{\text{ημ}0} = \pi$

3. ⓐ $\int_1^3 2x \ln x \, dx = \int_1^3 (x^2)' \ln x \, dx =$

$= \left(x^2 \ln x\right)_1^3 - \int_1^3 x^2 \cdot \frac{1}{x} \, dx =$

$= 3^2 \ln 3 - 1^2 \ln 1 - \int_1^3 x \, dx =$

$= 9 \ln 3 - \left(\frac{x^2}{2}\right)_1^3 = 9 \ln 3 - \frac{1}{2}\left(x^2\right)_1^3$

$= 9 \ln 3 - \frac{1}{2}\left(3^2 - 1^2\right) = 9 \ln 3 - \frac{1}{2}(9-1) =$

$= 9 \ln 3 - \frac{1}{2} \cdot 8 = 9 \ln 3 - 4$.

ⓑ $\int_1^2 \ln x \, dx = \int_1^2 1 \cdot \ln x \, dx = \int_1^2 (x)' \ln x \, dx$

$= \left(x \ln x\right)_1^2 - \int_1^2 x \cdot \frac{1}{x} \, dx =$

$= 2 \ln 2 - 1 \cdot \ln 1 - \int_1^2 1 \, dx =$

$= 2 \ln 2 - (x)_1^2 = 2 \ln 2 - (2-1)$

$= 2 \ln 2 - 1$.

4. a) $$\int_1^2 \frac{\ln x}{x^2}\,dx = \int_1^2 \frac{1}{x^2} \ln x \, dx$$

$$= \int_1^2 \left(-\frac{1}{x}\right)' \ln x \, dx = \left(-\frac{1}{x}\ln x\right)\Big|_1^2 - \int_1^2 -\frac{1}{x}\cdot\frac{1}{x}\,dx$$

$$= -\left(\frac{1}{x}\ln x\right)\Big|_1^2 + \int_1^2 \frac{1}{x^2}\,dx =$$

$$= -\left(\frac{\ln 2}{2} - \frac{\ln 1}{1}\right) + \left(-\frac{1}{x}\right)\Big|_1^2 =$$

$$= -\frac{1}{2}\ln 2 - \left(\frac{1}{x}\right)\Big|_1^2 = -\frac{1}{2}\ln 2 - \left(\frac{1}{2} - 1\right)$$

$$= -\frac{1}{2}\ln 2 - \frac{1}{2} + 1.$$

(B) $\int_1^4 \frac{\ln x}{\sqrt{x}}\,dx = \int_1^4 \frac{1}{\sqrt{x}} \ln x\,dx$

$= \int_1^4 (2\sqrt{x})' \ln x\,dx =$

$= \left(2\sqrt{x}\ln x\right)_1^4 - \int_1^4 2\sqrt{x}\,\frac{1}{x}\,dx$

$= 2\sqrt{4}\ln 4 - 2\sqrt{1}\ln 1 - 2\int_1^4 \frac{\sqrt{x}}{x}\,dx$

$= 4\ln 4 - 0 - 2\int_1^4 \frac{\sqrt{x}}{x}\,dx =$

$\sqrt{x} = t$

$x = t^2$

$1 \cdot dx = 2t\,dt$

$= 4\ln 4 - 2 \cdot \int_1^2 \frac{t}{t^2}\,2t\,dt =$

$= 4\ln 4 - 2\cdot 2\int_1^2 1\,dt = 4\ln 4 - 4\,(t)_1^2$

$= 4\ln 4 - 4 .$

5. (a) $\int_0^\pi e^x \,\text{ημ}x\,dx$

$$I = \int_0^\pi e^x \,\text{ημ}x\,dx$$

$$I = \int_0^\pi (e^x)' \,\text{ημ}x\,dx$$

$$I = (e^x \,\text{ημ}x)_0^\pi - \int_0^\pi e^x \,\text{συν}x\,dx$$

$$I = e^\pi \,\text{ημ}\pi - e^0 \,\text{ημ}0 - \int_0^\pi (e^x)' \,\text{συν}x\,dx$$

$$I = -\left[(e^x \,\text{συν}x)_0^\pi - \int_0^\pi e^x(-\text{ημ}x)\,dx \right]$$

$$I = -\left[e^\pi \,\text{συν}\pi - e^0 \,\text{συν}0 + \int_0^\pi e^x \,\text{ημ}x\,dx \right]$$

$$I = -\left[-e^\pi - 1 + I \right]$$

$$I = e^\pi + 1 - I \Rightarrow 2I = e^\pi + 1$$

$$I = \frac{e^\pi + 1}{2}$$

③ $\int_0^{\pi} e^x \cos 2x \, dx$

$$I = \int_0^{\pi} e^x \cos 2x \, dx = \int_0^{\pi} (e^x)' \cos 2x \, dx$$

$$I = \left(e^x \cos 2x\right)_0^{\pi} - \int_0^{\pi} e^x \cdot (-\sin 2x) \cdot 2 \, dx$$

$$I = e^{\pi} \cos 2\pi - e^0 \cos 0 + 2 \int_0^{\pi} e^x \sin 2x \, dx$$

$$I = e^{\pi} - 1 + 2 \int_0^{\pi} (e^x)' \sin 2x \, dx$$

$$I = e^{\pi} - 1 + 2 \left(\overset{0}{\cancel{\left(e^x \sin 2x\right)_0^{\pi}}} - \int_0^{\pi} 2 e^x \cos 2x \, dx \right)$$

$$I = e^{\pi} - 1 + 2(-2I)$$

$$I = e^{\pi} - 1 - 4I$$

$$5I = e^{\pi} - 1 \qquad I = \frac{e^{\pi} - 1}{5}$$

6. ⓐ $\int_0^1 x e^{2x}\, dx = \int_0^1 x \left(\frac{e^{2x}}{2}\right)' dx$

$= \left(\frac{1}{2} x e^{2x}\right)_0^1 - \int_0^1 \frac{1}{2} e^{2x} \cdot 1\, dx$

$= \frac{1}{2} e^2 - 0 - \frac{1}{2} \int_0^1 e^{2x}\, dx$

$= \frac{1}{2} e^2 - \frac{1}{2} \left(\frac{e^{2x}}{2}\right)_0^1 =$

$= \frac{1}{2} e^2 - \frac{1}{4}\left(e^2 - e^0\right) = \frac{e^2}{2} - \frac{e^2}{4} + \frac{1}{4} = \frac{e^2}{4} + \frac{1}{4}$

ⓑ $\int_0^\pi 4x\, \sigma\upsilon\nu 2x\, dx = \int_0^\pi 4x \left(\frac{\eta\mu 2x}{2}\right)' dx =$

$= \left(\frac{4x}{2} \eta\mu 2x\right)_0^\pi - \int_0^\pi \frac{\eta\mu 2x}{2} \cdot 4\, dx =$

$= 2\overset{0}{\cancel{\left(x\, \eta\mu 2x\right)_0^\pi}} - 2 \int_0^\pi \eta\mu 2x\, dx =$

$= -2 \left(-\frac{\sigma\upsilon\nu 2x}{2}\right)_0^\pi = \left(\sigma\upsilon\nu 2x\right)_0^\pi =$

$= \sigma\upsilon\nu 2\pi - \sigma\upsilon\nu 0 = 1 - 1 = 0.$

ε) $\int_0^1 \frac{2x+1}{e^x}\,dx = \int_0^1 (2x+1)\,e^{-x}\,dx$

$= \int_0^1 (2x+1)\,(-e^{-x})'\,dx =$

$= \left(-(2x+1)e^{-x}\right)_0^1 - \int_0^1 -e^{-x}\cdot 2\,dx$

$= -\left((2x+1)e^{-x}\right)_0^1 + 2\int_0^1 e^{-x}\,dx$

$= -\left(3e^{-1} - e^0\right) + 2\left(-e^{-x}\right)_0^1$

$= -3\frac{1}{e} + 1 - 2\left(e^{-x}\right)_0^1 =$

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

$= -\frac{3}{e} + 1 - \frac{2}{e} + 2 = -\frac{5}{e} + 3.$

15. (α) $\int_0^{\frac{\pi}{2}} \text{ημ}\left(x-\frac{\pi}{6}\right)dx = \int_{-\frac{\pi}{6}}^{\frac{\pi}{3}} \text{ημ}\, t \, dt$

$x-\frac{\pi}{6}=t$

$dx = dt$

$$= \left(-\text{συν}\, t\right)_{-\frac{\pi}{6}}^{\frac{\pi}{3}} = -\left(\text{συν}\frac{\pi}{3} - \text{συν}\left(-\frac{\pi}{6}\right)\right)$$

$$= -\left(\frac{1}{2} - \text{συν}\frac{\pi}{6}\right) = -\frac{1}{2} + \frac{\sqrt{3}}{2}$$

$\text{συν}(-x) = \text{συν}\, x$

(β) $\int_0^1 \frac{1}{(3x+1)^2}dx = \int_1^4 \frac{1}{t^2}\frac{1}{3}dt =$

$3x+1=t$

$3dx = dt$

$dx = \frac{1}{3}dt$

$$= \frac{1}{3}\left(-\frac{1}{t}\right)_1^4 =$$

$$= -\frac{1}{3}\left(\frac{1}{4}-1\right) =$$

$$= -\frac{1}{12} + \frac{1}{3}$$

(ε) $\int_0^4 \sqrt{2x+1}\,dx = \int_1^3 t\,t\,dt$

$\sqrt{2x+1} = t$

$2x+1 = t^2$

$2\,dx = 2t\,dt$

$dx = t\,dt$

$= \int_1^3 t^2\,dt$

$= \frac{1}{3}\left(t^3\right)_1^3$

$= \frac{1}{3}(27-1) = \frac{26}{3}$

4. Αν εχω ολοκληρωματα της μορφης.

$\int xe^{x}\,dx$, $\int x\,ημx\,dx$, $\int x\,συνx\,dx$, $\int x\,\ln x\,dx$

και παραπλησια δουλευω με την παραγοντικη ολοκληρωση

$$\boxed{\int_{α}^{β} [f(x)]'g(x)\,dx = \left[f(x)g(x)\right]_{α}^{β} - \int_{α}^{β} f(x)g'(x)\,dx}$$

5. Αν εχω ολοκληρωματα της μορφης.

$\int e^{x}ημx\,dx$, $\int e^{x}συνx\,dx$ ή παραπλησια

εκτελω το "κυκλικο" ολοκληρωμα.

6. Αν δεν δουλευει τιποτα απο τα παραπανω λογικα πρεπει να θεσω κατι μεσα στο ολοκληρωμα και να δουλεψω οπως εχουμε πει.

Στρατηγικη επιλυσης ολοκληρωματων

Οταν εχουμε μπροστα μας ενα ολοκληρωμα προσπαθουμε να το επιλυσουμε τηρωντας τα επομενα βηματα.

1. Αρχικα προσπαθω να βρω παραγουσα με το ματι για να τελειωνω.

2. Αν ειναι κλασμα κοιταω μηπως ο αριθμητης ειναι η παραγωγος του παρονομαστη γιατι τοτε η παραγουσα που ψαχνω ειναι " ln|παρονομαστη| "

3. Αν ειναι κλασμα με πολυωνυμα πανω και κατω τοτε:

(i) Αν ο αριθμητης ειναι μικροτερου βαθμου του παρονομαστη και ο παρονομαστης παραγοντοποιειται σε πρωτοβαθμιους παραγοντες δουλευω με τη μεθοδο των A και B.

(ii) Αν ο αριθμητης εχει βαθμο μεγαλυτερο ή ισο του παρονομαστη τοτε εκτελω διαιρεση πολυωνυμων και μετα οτι προκυψει.

Ενοτητα 36

2. (γ) $f(x) = \frac{e^x}{e^x+1}$, $x=0$, $x=\ln 2$

E : C_f , $x'x$, $x=0$, $x=\ln 2$

$$E = \int_0^{\ln 2} |f(x)|\,dx = \int_0^{\ln 2} \left|\overset{+}{\frac{e^x}{e^x+1}}\right| dx$$

$$= \int_0^{\ln 2} \frac{e^x}{e^x+1}\,dx = \left(\ln|e^x+1|\right)_0^{\ln 2}$$

$$= \ln(e^{\ln 2}+1) - \ln(e^0+1) = \ln 3 - \ln 2$$

$$= \ln\frac{3}{2}.$$

3. (γ) $f(x) = 3x^2-2x+1$ $x=0$ $x=1$

E : C_f , $x'x$, $x=0$, $x=1$

$$E = \int_0^1 |f(x)|\,dx = \int_0^1 |\overset{+}{\underset{\Delta<0}{3x^2-2x+1}}|\,dx$$

Σχολιο

Οταν ενα τριωνυμο εχει $\Delta \leq 0$ τοτε διατηρει σταθερο προσημο, ομοσημο του α.

$$= \int_0^1 3x^2 - 2x + 1 \, dx = \int_0^1 3x^2 \, dx - \int_0^1 2x \, dx + \int_0^1 dx$$

$$= (x^3)_0^1 - (x^2)_0^1 + (x)_0^1 = 1 - 1 + 1 = 1$$

4. ① E: C_f, $x'x$, $x=-1$, $x=2$

$f(x) = x^2 - 3x$

$$E = \int_{-1}^{2} |f(x)| \, dx = \int_{-1}^{2} |x^2 - 3x| \, dx =$$

x	-1 0 2 3
x^2-3x	$+$ 0 $-$ 0 $+$

παρεμβάλλεται ρίζα.

$$= \int_{-1}^{0} x^2 - 3x \, dx + \int_0^2 -x^2 + 3x \, dx$$

$$= \frac{1}{3}(x^3)_{-1}^{0} - \frac{3}{2}(x^2)_{-1}^{0} - \frac{1}{3}(x^3)_0^2 + \frac{3}{2}(x^2)_0^2$$

$$= \text{κτλ.}$$

5. (a) E: C_f, $x'x$ $\qquad f(x) = x^3 - x$

$$E = \int_0^3 |f(x)|\,dx = \int_{-1}^0 f(x)\,dx + \int_0^1 -f(x)\,dx$$

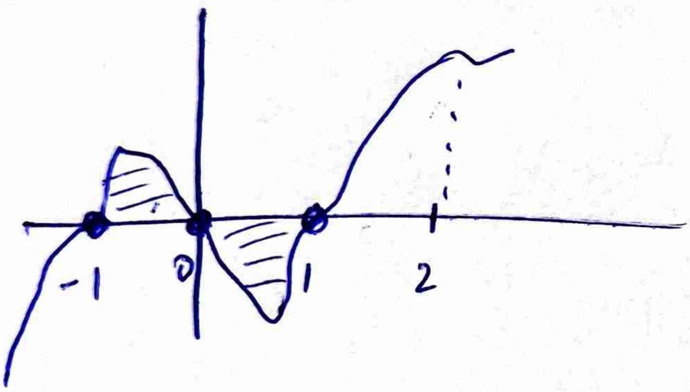
κτλ.

$\longrightarrow f(x) = 0 \Rightarrow x^3 - x = 0$

$x(x^2-1) = 0$

$x = 0 \quad x = 1 \quad x = -1$

x		-1		0		1	
x	$-$		$-$	0	$+$		$+$
x^2-1	$+$	0	$-$		$-$	0	$+$
$f(x)$	$-$		$+$		$-$		$+$



(B) E: C_f, $x'x$, $x = 2$

$$E = \int_{-1}^2 |f(x)|\,dx = \int_{-1}^0 f(x)\,dx + \int_0^1 -f(x)\,dx + \int_1^2 f(x)\,dx.$$

6. $f(x) = \dfrac{x}{x^2+1}$

$\longrightarrow f(x) = 0$

$\dfrac{x}{x^2+1} = 0$

$x = 0$

$E : C_f,\ x'x,\ x = 1$

$E = \int_0^1 |f(x)|\,dx = \int_0^1 \left|\dfrac{x}{x^2+1}\right| dx$ (+)

$= \int_0^1 \dfrac{x}{x^2+1}\,dx = \dfrac{1}{2}\int_0^1 \dfrac{2x}{x^2+1}\,dx$

$= \dfrac{1}{2}\left(\ln(x^2+1)\right)_0^1 = \dfrac{1}{2}\ln 2.$

7. B $f(x) = \frac{1}{x} - e^{x-1}, \; x>0$ $\qquad x = 1$

$f(x) = 0 \Rightarrow f(x) = f(1)$

f 1-1

$\underline{\underline{x = 1}}$

$f'(x) = -\frac{1}{x^2} - e^{x-1} < 0$

$f \downarrow \Rightarrow f$ 1-1

$E = \int_1^2 |f(x)|\,dx = \int_1^2 \left|\frac{1}{x} - e^{x-1}\right| dx$

$2 > x > 1$

$f \downarrow$

$f(2) < f(x) < f(1)$

$f(x) < 0$

$= \int_1^2 e^{x-1} - \frac{1}{x}\,dx$

$= \int_1^2 e^{x-1}\,dx - \int_1^2 \frac{1}{x}\,dx$

$= \left(e^{x-1}\right)_1^2 - \left(\ln x\right)_1^2$

$= e^1 - 1 - (\ln 2) = e - 1 - \ln 2$

8. $f(x) = e^x - \ln(x+1) \quad , x > -1$

ⓐ Νδο $f(x) \geq 1$

$f'(x) = e^x - \dfrac{1}{x+1} \qquad f'(0) = 0$

$f''(x) = e^x + \dfrac{1}{(x+1)^2} > 0$

x	-1	0	
f''	$+$		$+$
f'	$\nearrow$ $-$	0	$+$ $\nearrow$
f	$\searrow$		$\nearrow$

$f(x) \geq f(0)$

$f(x) \geq 1$

ⓑ $E : C_g , x'x , x = 1$

$g(x) = 2x\,(f(x) - 1)$

$E = \int_0^1 |g(x)|\,dx = \int_0^1 |\overset{\oplus}{2x}\,(\overset{\oplus}{f(x) - 1})|\,dx$ $\quad (*)$

$\rightarrow g(x) = 0 \Rightarrow 2x\,(f(x) - 1) = 0$

$2x = 0$ ή $f(x) - 1 = 0$

$x = 0$ $\qquad f(x) = 1$

$x = 0$,

(*) $\int_0^1 2x\,(f(x)-1)\,dx =$

$= \int_0^1 2x\left(e^x - \ln(x+1) - 1\right)\,dx$

$= \int_0^1 2xe^x - 2x\ln(x+1) - 2x\,dx$

$= \int_0^1 2xe^x\,dx - \int_0^1 2x\ln(x+1)\,dx - \int_0^1 2x\,dx$

(#)

$\rightarrow \int_0^1 2xe^x\,dx = \int_0^1 2x\,(e^x)'\,dx =$

$= \left(2xe^x\right)_0^1 - \int_0^1 e^x \cdot 2\,dx =$

$= 2e - 0 - 2\,(e^x)_0^1 =$

$= 2e - 2(e-1) = 2$

$\rightarrow \int_0^1 2x\,dx = (x^2)_0^1 = 1$

$$\rightarrow \int_0^1 2x \ln(x+1)\,dx = \int_0^1 (x^2)' \ln(x+1)\,dx$$

$$= \left(x^2 \ln(x+1)\right)_0^1 - \int_0^1 x^2 \frac{1}{x+1}\,dx$$

$$= \ln 2 - \int_0^1 \frac{x^2}{x+1}\,dx =$$

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

$$\begin{array}{l|l} x^2 & x+1 \\ \hline -(x^2+x) & x-1 \\ \hline -x & \\ -(-x-1) & \\ \hline 1 & \end{array}$$

$$= \ln 2 - \int_0^1 x-1\,dx - \int_0^1 \frac{1}{x+1}\,dx$$

$$= \ln 2 - \frac{1}{2}(x^2)_0^1 + (x)_0^1 - \left(\ln(x+1)\right)_0^1$$

$$= \cancel{\ln 2} - \frac{1}{2} + 1 - \cancel{\ln 2}$$

$$= \frac{1}{2}.$$

#

$$2 - \frac{1}{2} - 1 = \frac{1}{2}.$$

9. $f(0)=1$ $f(2)=2$.

$f \nearrow$

N.δ.o $4 < \int_1^{e^4} \frac{f(\sqrt{\ln x})}{x} dx < 8$.

Θέτω $\sqrt{\ln x} = t$

$\ln x = t^2$

$\frac{1}{x} dx = 2t\, dt$

$$4 < \int_0^2 f(t)\, 2t\, dt < 8$$

$$\boxed{2 < \int_0^2 x f(x)\, dt < 4.}$$

$0 < x < 2$

$f \nearrow$

$f(0) < f(x) < f(2)$

$1 < f(x) < 2$

$x < x f(x) < 2x$

$$\int_0^2 x\, dx < \int_0^2 x f(x)\, dx < \int_0^2 2x\, dx$$

$$\frac{1}{2}\left(x^2\right)_0^2 < \int_0^2 x f(x)\,dx < \left(x^2\right)_0^2$$

$$\frac{1}{2}\,4 < \int_0^2 x f(x)\,dx < 4$$

$$2 < \int_0^2 x f(x)\,dx < 4$$

10. $f(x) = 2e^{x-2} - x^2$

α) $f'(x) = 2e^{x-2} - 2x$

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

$\longrightarrow f''(x) = 0 \Rightarrow 2e^{x-2} - 2 = 0$

$e^{x-2} = 1$

$\underline{x = 2}$

x		2	
f''	$-$	0	$+$
f	$\cap$		$\cup$

$y - f(2) = f'(2)(x-2)$

$y - (-2) = -2(x-2)$

$y + 2 = -2x + 4$

$\boxed{y = -2x + 2}$

γ) i) Νδο $\int_e^{e^2} \frac{f(x)}{x}\,dx > -2e^2 + 2e + 2$

$\forall x > 2$ η f κυρτή $f(x) > -2x + 2$

$$\frac{f(x)}{x} > -2 + \frac{2}{x}$$

$$\int_e^{e^2} \frac{f(x)}{x}\, dx > \int_e^{e^2} -2 + \frac{2}{x}\, dx$$

$$\int_e^{e^2} \frac{f(x)}{x}\, dx > -2(x)_e^{e^2} + 2(\ln x)_e^{e^2}$$

$$\int_e^{e^2} \frac{f(x)}{x}\, dx > -2(e^2-e)+2(2-1)$$

$$\int_e^{e^2} \frac{f(x)}{x}\, dx > -2e^2+2e+2$$

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11) Mq $\int_2^3 x f(x)\, dx > -\frac{23}{3}$

$\forall x > 2 \quad f(x) > -2x+2$

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

$$\int_2^3 x f(x)\, dx > \int_2^3 -2x^2+2x$$

$$\rightarrow \int_2^3 -2x^2+2x\,dx = \int_2^3 -2x^2\,dx + \int_2^3 2x\,dx$$

$$= -\frac{2}{3}\left(x^3\right)_2^3 + \left(x^2\right)_2^3$$

$$= -\frac{2}{3}\,19 + 5 = -\frac{38}{3} + 5$$

$$= -\frac{38}{3} + \frac{15}{3} = -\frac{23}{3}.$$

iii) ν.δ.ο. $\int_0^1 f(e^x+2)\,dx > -2e$

α' τρόπος

$\int_0^1 f(e^x+2)\,dx$

$e^x+2=t$

$e^x = t-2$

$e^x\,dx = dt$

$(t-2)\,dx = dt \qquad dx = \frac{1}{t-2}\,dt$

$$\Rightarrow \int_3^{e+2} \frac{f(t)}{t-2}\,dt > -2e$$

Αρκει ν.δ.ο.

$$\int_3^{e+2} \frac{f(x)}{x-2}\,dx > -2e$$

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

$$\int_3^{e+2} \frac{f(x)}{x-2}\,dx > \int_3^{e+2} \frac{-2x}{x-2} + \frac{2}{x-2}\,dx \Longrightarrow$$

$$\rightarrow \int_3^{e+2} \frac{-2x}{x-2}\,dx = -2\int_3^{e+2} \frac{x}{x-2}\,dx$$

$$= -2\int_3^{e+2} \frac{x+2-2}{x-2}\,dx = -2\int_3^{e+2} 1 + \frac{2}{x-2}\,dx$$

$$= -2\,(x)_3^{e+2} - 2\left(\ln(x-2)\right)_3^{e+2} =$$

$$= -2(e+2-3) - 2 = -2e$$

$$\longrightarrow \int_3^{e+2} \frac{2}{x-2}\,dx = 2\left(\ln(x-2)\right)_3^{e+2} =$$

$$= 2(1) = 2$$

$$\int_3^{e+2} \frac{f(x)}{x-2}\,dx > -2e+2 \Rightarrow \int_3^{e+2} \frac{f(x)}{x-2}\,dx > -2e$$

Β' τρόπος

νδο $\int_0^1 f(e^x+2)\,dx > -2e$.

$\forall x>2 \qquad f(x) > -2x+2$

$$f(e^x+2) > -2(e^x+2)+2$$

$$f(e^x+2) > -2e^x-2$$

$$\int_0^1 f(e^x+2)\,dx > \int_0^1 -2e^x-2\,dx$$

$$\int_0^1 f(e^x+2)\,dx > -2\left(e^x\right)_0^1 - 2\left(x\right)_0^1$$

$$\int_0^1 f(e^x+2)\,dx > -2(e-1)-2$$

$$\int_0^1 f(e^x+2)\,dx > -2e$$

Επομενο Μαθημα

Τεταρτη 25/2 9 -11:30

35

2 γ δ

3 γ

4 γ δ ε

5 γ

6 γ δ

24

15 β γ.

36

2 α β

3 α β

4 α β

7 α

Παλια

35

16 α β δ

17 α

18 α β δ

37

2

3

11

5