

$$4^{x+1} = 4^x \cdot 4^1$$

$$\rightarrow 4^x + 4$$

$$w^2 - 2w = 0 \Leftrightarrow$$

$$w(w - 2) = 0$$

$$w = 0$$

$$w - 2 = 0$$

$$w = 2$$

$$w^2 - 2w = 0$$

$$a = 1, \quad b = -2, \quad c = 0$$

$$\Delta = b^2 - 4 \cdot a \cdot c = (-2)^2 - 4 \cdot 1 \cdot 0 = 4$$

$$3^{2x+1} - 8 \cdot 3^{x+1} - 27 = 0$$

Dim $3^{x+1} = y \Rightarrow (3^{x+1})^2 = y^2 \Leftrightarrow$

$$3^{2x+2} = y^2 \Leftrightarrow 3^{2x+1+1} = y^2 \Leftrightarrow 3^{2x+1} \cdot 3^1 = y^2 \Leftrightarrow$$

$$3^{2x+1} = \frac{y^2}{3}$$

$$\frac{y^2}{3} - 8y - 27 = 0$$

$$3^{2x} \cdot 3^1 - 8 \cdot 3^x \cdot 3^1 - 27 = 0$$

Dim $3^x = y \Rightarrow (3^x)^2 = y^2 \Leftrightarrow 3^{2x} = y^2$

$$3y^2 - 24y - 27 = 0$$

$$\sqrt{3364}$$

$$10^2 \quad 20^2 \quad 30^2 \quad 40^2 \quad 50^2 \quad 60^2 \quad 70^2 \quad 80^2 \quad 90^2$$

$$100 \quad 1600 \quad 2500 \quad 3600$$

51 (52) 53 54 55 56 57 (58) 59

$$\underline{αβ.1 / φυλλo}$$

$$f(x) = \ln(e^x - 1)$$

$$(a) e^x - 1 > 0 \Leftrightarrow$$

$$e^x > 1 \Leftrightarrow$$

$$e^x > e^0 \quad \left(\begin{smallmatrix} e^x \uparrow \\ \leftarrow \end{smallmatrix} \right)$$

$$x > 0$$

$$A = (0, +\infty)$$

Τέμνση των x

με $y = 0$.

Λίμνη μου εξίσωση

$$f(x) = 0 \Leftrightarrow x > 0$$

$$\ln(e^x - 1) = 0 \Leftrightarrow$$

$$\ln(e^x - 1) = \ln 1 \Leftrightarrow$$

$$e^x - 1 = 1 \Leftrightarrow$$

$$e^x = 2 \Leftrightarrow$$

$$\ln e^x = \ln 2 \Leftrightarrow$$

$$x \cdot \ln e = \ln 2$$

$$x = \ln 2 \text{ σύμφωνα}$$

$$A(\ln 2, 0)$$

$$(b) f(x) = x - 1, \quad x > 0$$

$$\ln(e^x - 1) = x - 1 \Leftrightarrow$$

$$\ln(e^x - 1) = (x - 1) \cdot 1 \Leftrightarrow$$

$$\ln(e^x - 1) = (x - 1) \cdot \ln e \Leftrightarrow$$

$$\ln(e^x - 1) = \ln e^{x-1} \Leftrightarrow$$

$$e^x - 1 = e^{x-1} \Leftrightarrow$$

$$e^x - 1 = \frac{e^x}{e} \Leftrightarrow$$

$$e \cdot e^x - e = e \cdot \frac{e^x}{e} \Leftrightarrow$$

$$\text{δίνω } e^x = y$$

$$ey - e = y \Leftrightarrow$$

$$ey - y = e \Leftrightarrow$$

$$(e-1)y = e \Leftrightarrow$$

$$y = \frac{e}{e-1} \Leftrightarrow$$

$$e^x = \frac{e}{e-1} \Leftrightarrow$$

$$\ln e^x = \ln \frac{e}{e-1} \Leftrightarrow$$

$$\boxed{x \cdot \cancel{\ln e} = \ln \frac{e}{e-1}}$$

5 min

$$\text{Aqui } e > e-1 \Leftrightarrow$$

$$\frac{e}{e-1} > 1 \Leftrightarrow$$

$$\ln \frac{e}{e-1} > \ln 1$$

$$\ln \frac{e}{e-1} > 0$$

$$(8) \quad C_f, \quad y = x + a$$

Προσζη να ζιζωου mu
ζιζωου

$$f(x) = x + a \quad (=)$$

$$\ln(e^x - 1) = x + a, \quad a > 0, x > 0$$

για $x > 0$ και $a > 0$.

$$\ln(e^x - 1) = (x + a) \cdot 1 \quad (=)$$

$$\ln(e^x - 1) = (x + a) \cdot \ln e$$

$$\ln(e^x - 1) = \ln e^{x+a} \quad (\rightarrow)$$

$$e^x - 1 = e^x \cdot e^a$$

$$\text{οζω} \quad e^x = y$$

$$y - 1 = y \cdot e^a$$

$$\ln\left(\frac{a}{b}\right) = \ln a - \ln b$$

$$\ln(a - b) = \frac{\ln a}{\ln b}$$

$$\ln \sqrt{x} = \sqrt{\ln x}$$

$$\frac{1}{2} \ln x = \sqrt{\ln x}$$

given $\ln x = y$

$$\frac{1}{2} y = \sqrt{y} \quad y > 0$$

$$\frac{1}{4} y^2 = y \quad (-)$$

$$y^2 = 4y \quad (-)$$

$$y^2 - 4y = 0 \quad (-) \dots$$

$$x > 0$$

$$w = 2w^{\frac{1}{2}}$$

$$w^2 = (2 \cdot w^{\frac{1}{2}})^2$$

$$w^2 = 4w$$

