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4C1 (2)

Weekend Assignment (Exponential & Logarithmic Functions) Date 8/4/05 No.

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34. a.

$4\log_x 2 = \log_2 x$

$\log_x 16 = \log_2 x$

$\frac{\lg 16}{\lg x} = \frac{\lg x}{\lg 2}$

$(\lg x)^2 = 4(\lg 2)^2$

$\lg x = 2\lg 2$ or $\lg x = -2\lg 2$

$\lg x = \lg 4$ $\qquad \Rightarrow x = 2^{-2}$

$\Rightarrow x = 4$ // $\qquad x = \frac{1}{4}$ //

b.

$3^{x^2} = \frac{9^{x+1}}{27^x}$

$(3^{x^2})(3^{3x}) = 3^{2(x+1)}$

$3^{x^2+3x} = 3^{2x+2}$

$\Rightarrow x^2 + 3x = 2x + 2$

$x^2 + x - 2 = 0$

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

$x = -2$ // or $x = 1$ //

c.

$e^{-x}(2e^{-x} + 1) = 15$

Let $y = e^{-x}$

$y(2y + 1) = 15$

$2y^2 + y - 15 = 0$

$(2y - 5)(y + 3) = 0$

$2y = 5$ or $y = -3$

$y = \frac{5}{2}$

$2y \quad -5 \quad -5y$

$y \quad 3 \quad 6y$

$2y^2 \quad -5 \quad y$

When $y = -3$,

$e^{-x} = -3$

x is undefined.

When $y = \frac{5}{2}$,

$e^{-x} = \frac{5}{2}$

$x = -\ln \frac{5}{2}$

$x = -0.91629$ (5sf)

$= -0.916$ (3sf) //

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43. $e^{2x+1} + 8e = 6e^{x+1}$

$(e^{2x})(e) + 8e = (6e^{x})(e)$

$e^{2x} + 8 = 6e^{x}$

Let $y = e^{x}$

$y^2 + 8 = 6y$

$y^2 - 6y + 8 = 0$

$(y-4)(y-2) = 0$

$y = 4$ or $y = 2$

When $y = 4$,

$e^{x} = 4$

$x = \ln 4$

$x = 1.39$ (2 dp)

When $y = 2$,

$e^{x} = 2$

$x = \ln 2$

$x = 0.69$ (2 dp)

62. $\frac{8^{x}}{4^{y}} = 32$

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

$2^{3x-2y} = 2^{5}$

$\Rightarrow 3x - 2y = 5$ —— (1)

$\lg(10x - 4y) = 2\lg 3 + \lg 2$

$\lg(10x - 4y) = \lg 9 + \lg 2$

$\lg(10x - 4y) = \lg 18$

$\Rightarrow 10x - 4y = 18$

$5x - 2y = 9$ —— (2)

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$(2): 2y = 5x - 9$ —— (3)

Sub (3) into (1):

$3x - (5x - 9) = 5$

$3x - 5x + 9 = 5$

$-2x = -4$

$x = 2$ //

When $x = 2$,

$2y = 5(2) - 9$

$y = 0.5$ //

70. a. $(27^x)(2^{2x})(4) = (3^{2x-1})(2^x)$

$(3^{3x})(2^{2x})(2^2) = (3^{2x-1})(2^x)$

$(3^{3x})(2^x)^2(2^2) = (3^{2x})(3^{-1})(2^x)$

$(3^{3x-2x})(2^x)(2^2) = (3^{-1})$

$(3^x)(2^x) = \frac{1}{3} \times \frac{1}{4}$

$6^x = \frac{1}{12}$ //

b. $e^x - 1 = 6e^{-x}$

Let $y = e^x$

$y - 1 = \frac{6}{y}$

$y^2 - y - 6 = 0$

$(y-3)(y+2) = 0$

$y = 3$ or $y = -2$

When $y = -2$,

$e^x = -2$

$x = \ln -2$ (n.a.)

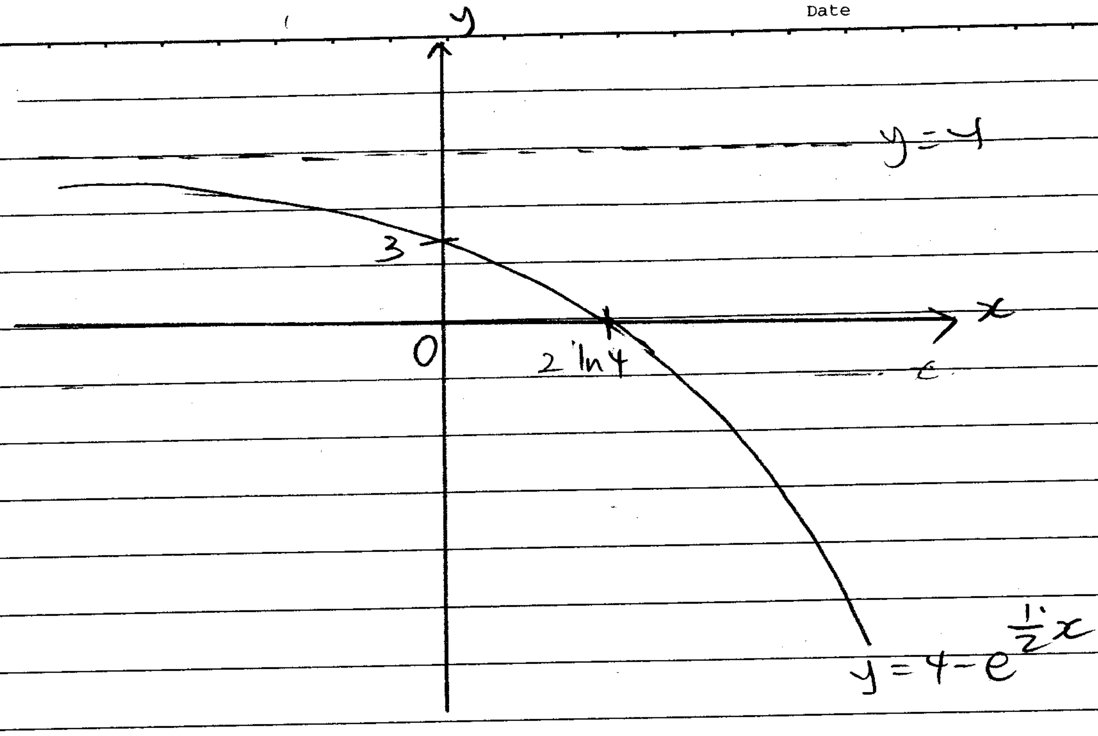
When $y = 3$,

$e^x = 3$

$x = \ln 3$

$\therefore a = 3$ //

80 (i)



(ii) $2 + x - e^{\frac{1}{2}x} = 0$

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

$$4 - e^{\frac{1}{2}x} = -x + 2$$

$\therefore$ ~~Draw~~ sketch line $y = 2 - x$. The x-coordinate of the point of intersection of the curve $y = 4 - e^{\frac{1}{2}x}$ and line $y = 2 - x$ is the ~~ans~~ solution for the ~~solu~~ equation $2 + x - e^{\frac{1}{2}x} = 0$