PRE–AP ALGEBRA 2

2B.6 CLASSWORK

1) Solve $2^{4x} \cdot 3^{2x} = 45$ for x.

$2^{4x} \cdot 3^{2x} = (2^4)^x \cdot (3^2)^x = 16^x \cdot 9^x =$

$= (16 \cdot 9)^x = 144^x = 45,$

$\log_{144} 144^x = \log_{144} 45,$

$x = \log_{144} 45 = 0.7660$

2) Solve $e^x + e^{-x} = 4$ for x.

$e^x \cdot e^x + e^x \cdot e^{-x} = 4e^x$

$e^x \cdot e^{-x} = e^{x-x} = e^0 = 1$

$(e^x)^2 + 1 = 4(e^x)$

$(e^x)^2 - 4(e^x) + 1 = 0$

Let $z = e^x$ (or $x = \ln z$)

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

$z = \dfrac{4 \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$

$= \dfrac{4 \pm \sqrt{12}}{2} = \dfrac{4 \pm \sqrt{4}\sqrt{3}}{2} =$

$= \dfrac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$

$x = \ln(2 - \sqrt{3}) = -1.3170$

$x = \ln(2 + \sqrt{3}) = 1.3170$

3) Given $y = f(x)$, calculate $y = f^{-1}(x)$.

a) $y = f(x) = 10^{8x-3} + 7$

b) $y = f(x) = \ln(3x + 5) - 8$

a) $x = 10^{8y-3} + 7, \quad 10^{8y-3} = x - 7$

$\log 10^{8y-3} = \log(x-7)$

$8y - 3 = \log(x-7)$

$8y = 3 + \log(x-7)$

$y = f^{-1}(x) = \frac{1}{8}[3 + \log(x-7)]$

b) $x = \ln(3y+5) - 8$

$\ln(3y+5) = x + 8$

$e^{\ln(3y+5)} = e^{x+8}$

$3y + 5 = e^{x+8}$

$3y = e^{x+8} - 5$

$y = f^{-1}(x) = \frac{1}{3}[e^{x+8} - 5]$