Worksheet 2

1. Solve each of the following for x

   (a) $\dfrac{1}{2}\log(3x^2+4)-\log(x) = \log(2)$

   (b) $\ln(x+2)-\ln(x-2) = \ln(2)+\ln(x)$

   (c) $\ln x^2 = [\ln x]^2$

   (d) $5^{x-1} - 2^x = 0$

   (e) $\left(\dfrac{1}{4}\right)^{9x-5} = 32^{x+8}$

   (f) $2e^{2x} - 5e^x + 2 = 0$

   (g) $\log_5(x+3)+\log_5(x-1) = 1$

   (h) $5^x \cdot 3^{x-1} = 7^{2-x}$

2. Find the inverse of the following functions

   (a) $f(x) = \dfrac{3x}{1-4x}$

   (b) $y = \dfrac{3e^x}{e^x - 2}$

   (c) $g(x) = \ln\left[\dfrac{x-1}{x+1}\right]$

   (d) $h(x) = \sqrt{4 - e^{-2x}}$

   (e) $f(x) = \dfrac{2x-3}{4-5x}$

3. Medical professionals sometimes use iodine-131, a radiocative substance, to diagnose certain conditions of the thyroid gland. The formula for the proportion P of iodine-131 remaining in a patient's system t days after receiving the substance is given by $P = e^{(\ln(1/2)/8)t}$.

   (a) Find the inverse of this function and explain its meaning.

   (b) How long does it take for the proportion of iodine to drop to 10% of the original dose?