Review: exponential and logarithmic functions, etc.

Mr. Neeman. 10B, December 1, 2011.

#1. For each of the following functions: (a) sketch the graph, labelling any asymptotes and intersections with axes, (b) find the domain, (c) find the range, (d) find the monotonicty, (e) find the curvature, (f) say whether or not they're injective, surjective, bijective, (g) find the indicated images and preimages (if there are any)

(i) $f(x) = 2^x - 3$, image of $-\frac{1}{2}$, preimages of 13.
(ii) $f(x) = -\left(\frac{1}{3}\right)^x$, image of 0, preimages of 1.
(iii) $f(x) = 2 - \left(\frac{1}{e}\right)^x$, image of $\frac{3}{2}$, preimages of 1.
(iv) $f(x) = \log_2 x - 3$, image of 1, preimage of -1.
(v) $f(x) = \log_{\frac{1}{2}} x$, image of 8, preimage of $\frac{3}{2}$.
(vi) $f(x) = -1 - \ln x$, image of $\frac{1}{e}$, preimage of -2.

#2. (a) Express $\log_2 x - 3\log_2 y + \frac{1}{2}\log_2(xy)$ as a single logarithm

(b) Express $\ln \dfrac{x^3}{yz^{-2}}$ in terms of $\ln x$, $\ln y$, and $\ln z$.

(c) Find $\log_2 \sqrt{8}$.

#3. Change $\log_3 x$ to a logarithm with base $\frac{1}{9}$.

#4. Solve each of the following equations:
(a) $3^{x+1} - 2 = 8$
(b) $\sqrt{2^x} = \dfrac{4^{2x}}{16}$
(c) $\dfrac{2^{x+1}}{4} = \dfrac{1}{\sqrt{2}}$
(d) $\log_2(3x+1) = 1 + \log_2(2x-3)$
(e) $\log_3(2x-3) + \log_3(x-3) = \log_3(x+1)$
(f) $\log_2 x + 2 = \log_2(2x+4)$
(g) $\log_2(5x) - \log_2(x-3) = 4$