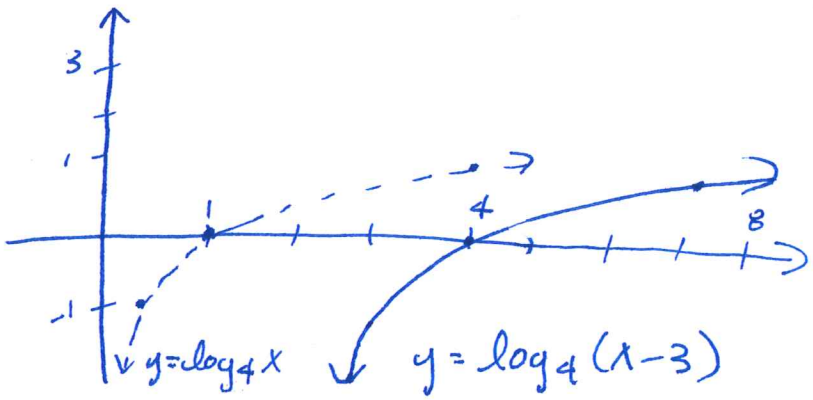
Math 1120F - Fall 2014
Worksheet 5 - §6.5, 6.6

Name(s): KEY

Name(s): _____

Work with partners in groups of 2-4. **This is required.**

1. Graph $f(x) = \log_4(x-3)$



2. Find the exact value of the following:

   (a) $\ln e^3$

$$\ln e^3 = 3 \ln e = 3$$

   (b) $e^{3\ln 2 - 2\ln 5}$

$$e^{3\ln 2 - 2\ln 5} = e^{\ln 2^3} \cdot e^{\ln 5^{-2}} = 2^3 \cdot 5^{-2} = \boxed{\frac{8}{25}}$$

3. If $\ln b = 6$ and $\ln c = -2$, find $\frac{1}{a}\ln\left(\frac{\sqrt{b}}{c}\right)^a$

$$\frac{1}{a}\ln\left(\frac{\sqrt{b}}{c}\right)^a = \ln\left(\frac{\sqrt{b}}{c}\right) = \ln(\sqrt{b}) - \ln c$$

$$= \frac{1}{2}\ln b - \ln c = \frac{1}{2}(6) - (-2) = 3 + 2 = \boxed{5}$$

4. Write $4[\ln z + \ln(z+5)] - 2\ln(z-5)$ as the logarithm of a single quantity.

$$4[\ln z + \ln(z+5)] - 2\ln(z-5) = 4\ln[z(z+5)] - \ln[(z-5)^2]$$

$$= \ln[(z(z+5))^4] - \ln[(z-5)^2]$$

$$= \ln\left[\frac{(z(z+5))^4}{(z-5)^2}\right]$$

5. Solve the following equations.

(a) $\log_6(x+4) + \log_6(x+3) = 1$

$\log_6(x+4) + \log_6(x+3) = 1$

$\log_6[(x+4)(x+3)] = 1$

$(x+4)(x+3) = 6^1$

$x^2 + 7x + 12 = 6$

$x^2 + 7x + 6 = 0$

$(x+1)(x+6) = 0$

$\boxed{x = -1}$ $x = -6$

(b) $\log e^x = 5$

$\log e^x = 5$

$\frac{\ln e^x}{\ln 10} = 5$

$\frac{x \ln e}{\ln 10} = 5$

$\boxed{x = 5 \ln 10}$

(c) $\log_3 243 = 2x + 1$

$\log_3 243 = 2x+1$

$243 = 3^{2x+1}$

$3^5 = 3^{2x+1}$

$5 = 2x+1$

$\boxed{x = 2}$

(d) $\log_2 8^x = -3$

$8^x = 2^{-3}$

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

$3x = -3 \Rightarrow \boxed{x = -1}$

(e) $\log_x 4 = 2$

$\log_x 4 = 2$

$4 = x^2$

$x = \pm 2$, $\boxed{x = 2}$

(f) $2e^x = 60$

$2e^x = 60$

$e^x = 30$

$\ln e^x = \ln 30$

$\boxed{x = \ln 30}$