Show all work.

1. Compare $\log_7 51$, $\log_8 61$, and $\log_9 71$. Which of these is greatest? Explain your reasoning.

2. Simplify $\log_{\sqrt{a}} a^2$ to find an exact numerical value.

3. Simplify $x^{3\log_x 2 - \log_x 5}$ to find an exact numerical value.

4. Solve algebraically.

    a. $\log_{\sqrt{a}} 3 = \log_a x$

5. Solve.

1. $\log_2 x + \log_2(x-2) = 3$

b.) $\log_2(\log_3 x) = 3$

c.) $\log_4(x^2) = (\log_4 x)^2$

d.) $\log_8 10 - \log_8(7-x) = \log_8 x$

e.) $\log_2(x^2 - 6x) = 3 + \log_2(1-x)$

f.) $9^x - 12(3^x) = -27$