

1. Write the following expressions as a sum and/or difference of logarithms in simplest form. Express exponents as factors.

$$\ln \left[\frac{\sqrt{x+1}}{x(x+1)^2} \right]$$

2. Let $f(x) = -x^2 - 3x + 4$. Write the function as $f(x) = a(x-h)^2 + k$, find vertex, axis of symmetry, max or min function value, sketch.
3. Graph the functions $f(x) = \log_2 x$ and $g(x) = 3^x$ on the same coordinate system. Clearly label at least three points for each graph.
4. Solve: $x^2 + 4x - 12 > 0$. Express the solution using interval notation and graph the solution set.
5. Solve: $5^{2x-1} = 7$. Give Exact solution and approximate solution (to three decimal places).
6. Solve: $125^{x+1} = \frac{1}{25}$. Give Exact solution and approximate solution (to three decimal places).
7. Solve: $\log_5(x+1) - \log_5(x-1) = 2$.
8. Solve: $\log_8(x+3) + \log_8(x+5) = 1$.
9. Let $f(x) = \sqrt[3]{x+1} - 2$ and $g(x) = (x+2)^3 - 1$. Show that f and g are inverses of each other.
10. Given $f(x) = 4x^2 - 3x + 1$ and $g(x) = 2x + 3$, find
- (a) $\left(\frac{f}{g}\right)(-2)$
- (b) $(f \circ g)(x)$
11. When a rocket is fired with an initial velocity, v , it will reach the height of $h(t) = vt - 16t^2$ after t seconds. If the initial velocity is 160 ft/s what is the maximum altitude the rocket will reach? When will it achieve this altitude?
12. How long does it take for your money to double in a savings account that has an annual interest rate of 4% compounded monthly? Express your answer in terms of years and months.

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$