1. Evaluate exactly. $e^{-\ln 23}$

2. Evaluate exactly. $\ln(e^{\ln^2})$

3. Find the equation of the asymptote of the graph $f(x) = -3e^{x-2} + 5$

4. Find the equation of the asymptote of the graph $f(x) = 2\ln(x-3) - 4$

5. Find the domain of the function $f(x) = e^{\ln(x+1)} + \ln(4-x^2)$. Write in interval notation.

6. Find the inverse function of $f(x) = 2^{-3x+5} + 1$

7. Simplify the expression. $\ln(x^3 + 8) - \ln(x + 2) - \ln(x^2 - 2x + 4)$

8. Write the expression as a sum, difference, and/or multiples of logarithms. $\ln\left(\frac{(x+3)^5}{\sqrt{x^4(y+1)^2}}\right)$

9. Find all real and exact solutions. $x^2 \cdot 2^x - 2^x = 0$

10. Find all real and exact solutions. $\log_2 3 + \log_2 x = \log_2 5 + \log_2(x - 2)$.

11. Find all real and exact solutions. $x^2e^x + 5xe^x - 6e^x = 0$.

12. The population of the world was estimated to have reached 6.5 billion in April 2006. The population growth rate for the world is estimated to be 1.4%. (Source: U.S. Census Bureau) $P(t) = 6.5(1.014)^t$ represents the world population in billions as a function of the number of years after April 2006. $(t = 0$ represents April 2006). Use the function to estimate the amount of time after April 2006 required for the world population to reach 13 billion. Round to the nearest number of years.

13. The half-life of radioactive iodine $^{131}I$ is 8.04 days. If 10 g of iodine 131 is initially present, then the amount of radioactive iodine still present after $t$ days is approximated by $A(t) = 10e^{-0.0862t}$ where $t$ is the time in days. How long will it take for the amount of $^{131}I$ to decay to 0.5 g? Round to the nearest 0.1 day.