

THEORETICAL PART:**Properties (Summary of Logarithmic Properties):**

1. The equations $x = a^y$ and $y = \log_a x$ are equivalent, and are, respectively, the exponential form and the logarithmic form of the same statement.
2. The inverse of the function $f(x) = a^x$ is $f^{-1}(x) = \log_a x$, and vice versa.
3. A consequence of the last point is that $\log_a(a^x) = x$ and $a^{\log_a x} = x$. In particular, $\log_a 1 = 0$ and $\log_a a = 1$.
4. $\log_a(xy) = \log_a x + \log_a y$.
5. $\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$.
6. $\log_a(x^r) = r \log_a x$.

PRACTICAL PART:

1. Solve the equation $3^{2-5x} = 11$. Express the answer exactly and as a decimal approximation.

2. Solve the equation $5^{3x-1} = 2^{x+3}$. Express the answer exactly and as a decimal approximation.

3. Solve the equation $\log_7(3x - 2) = 2$.

4. Solve the equation $\log_5 x = \log_5(2x + 3) - \log_5(2x - 3)$.

5. (Compounding Interest)

Rita is saving up money for a down payment on a new car. She currently has \$5500 but she knows she can get a loan at a lower interest rate if she can put down \$6000. If she invests her \$5500 in a money market account that earns an annual interest rate of 4.8% compounded monthly, how long will it take her to accumulate the \$6000?