

# AP Precalculus - M3Y & M3Z

## Exponentials and Logarithms - Homework 2

1. Solve the following inequalities:

(i)  $5^x - 15 \leq 10 - 4 \cdot 5^x$

(iv)  $\log(x + 1) > \log x + \log 5$

(ii)  $\frac{e^x - 1}{e^x + 1} < \frac{1}{2}$

(v)  $\log_{\frac{1}{3}}(x - 2) \geq -1$

(iii)  $\log_3(x - 12) < 3$

(vi)  $2 \log 5 + x \log 3 \leq \log 9 + x \log 5$

2. Find the domain and the inverse of the following functions:

(i)  $f(x) = \log(2x - 6)$

(ii)  $g(x) = 6^{5x-3}$

(iii)  $h(x) = \log_{\frac{1}{2}}(2^{2x-5} - 8)$

3. The following data represents the speed with which a person can kick a soccer ball at different ages

Age (Years)	4	10	20	30	50	60
Speed (Mph)	15	32	65	70	45	35

(i) Construct a quadratic regression model for this data with  $x = \text{Age}$  and  $y = \text{Speed}$ . Write the quadratic regression equation.

(ii) What does the regression model predict for the speed with which a 40 year old person can kick the soccer ball?

(iii) Find the residual of the speed with which a 20 year old person can kick the soccer ball.

(iv) Interpret the residual from part (iii).