Provide step by step solutions to problems with clear explanations for each step. Total credit: 200 pts. Time: 2 hours.

1) The function \( f(x) = |x| - 5 \) is not one-to-one. (15 pts)
   (a) Find a suitable restriction on the domain of \( f \) so that the new function that results is one-to-one.
   (b) Find the inverse of \( f \).

2) Express as single logarithm \( \log_{a} x - \frac{5}{4} \log_{a} y + \frac{1}{3} \log_{a} w - 3 \log_{a} z \). (10 pts)

3) The half-life of silicon-32 is 710 years. If 100 grams is present now, how much will be present in 600 years?
   (Round your answer to three decimal places.) (20 pts)

4) Find the exact value of \( \cos 5^\circ \sin 85^\circ + \sin 5^\circ \cos 85^\circ \). Do not use a calculator! (10 pts)

5) The current \( I \), in amperes, flowing through a particular ac (alternating current) circuit at time \( t \) seconds is
   \[ I = 220 \sin \left( 25\pi t - \frac{\pi}{8} \right) \] What is the period of the current? (10 pts)

6) Write the equation of a sine function satisfying: Amplitude: 2; Period: \( \pi \); Phase Shift: -6 (20 pts).

7) Find the exact value of \( \sin 255^\circ \) by using a sum or difference identity. (10 pts)

8) Express \( \sin 6\theta - \sin 4\theta \) as a product containing only sines and/or cosines. (10 pts)

9) Use a calculator to solve the equation \( \tan \theta = 2.6 \) on the interval \( 0 \leq \theta < 2\pi \). Round the answer to two decimal places. (10 pts)

10) Two sailboats leave a harbor in the Bahamas at the same time. The first sails at 25 mph in a direction 330°. The
    second sails at 30 mph in a direction 220°. Assuming that both boats maintain speed and heading, after 3 hours,
    how far apart are the boats? (20 pts)

11) Find the area of triangle \( ABC \) with sides of length \( a = 14.9 \text{ cm}; b = 13.7 \text{ cm and } c = 16.2 \text{ cm}. (15 pts)

12) Determine whether the graph of the equation \( 3x^2 + 8x - y = 72 \) is an ellipse, hyperbola, circle, or parabola. (15 pts)

13) Find the foci and vertices of the ellipse \( \frac{x^2}{225} + \frac{y^2}{625} = 1. (15 pts) \)

14) Meisha has $25,000 that she wants to invest. She invests it in accounts paying 12%, 7%, and 6% simple interest.
    The account paying 12% is a higher-risk account, so she wants the amount in that account to be half of the
    amount she has in the account paying 6% simple interest. If her annual interest is $1945, how much is invested
    at each rate? (20 pts)