

Last Name _____

First Name _____

ID# _____

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 $4 \log_a x - \frac{5}{4} \log_a y + \frac{1}{3} \log_a w - 3 \log_a z$. (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: π ; Phase Shift: $-\frac{\pi}{6}$ (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 $a = 14.9$ cm; $b = 13.7$ cm and $c = 16.2$ 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)