1. Approximate the value of $\log_2 427$ to four decimal places. *(6 points)*

2. Find the base b so that $\log_b 59049 = 5$. *(6 points)*

3. Determine if the following data are best modeled by a linear, exponential ($y = a \cdot b^x$), or logarithmic ($y = a + b \ln x$) model. Then find the equation for the model. Use the model to estimate the value of y when $x = 12$ to two decimals. *(8 points)*

x	4	6	8	10
y	5.1	6.5	8.0	11.1

4. Solve the following equation algebraically. Show your work. *(8 points)*

$$\ln(3x - 2) + \ln(x - 1) = 2 \ln x$$

5. If a principal of $10,000 is invested in an account that pays interest at a rate of 8% annually, find the amount present after 40 years if the interest is compounded (a) yearly; (b) monthly; (c) continuously. *(8 points)*

6. Find the equations of all asymptotes for the function

$$f(x) = \frac{2x^2 + 16x + 31}{x^2 - x + 20}$$

. Include the asymptotes along with the graph of the function to the right. Also indicate the x- and y-intercepts. *(8 points)*
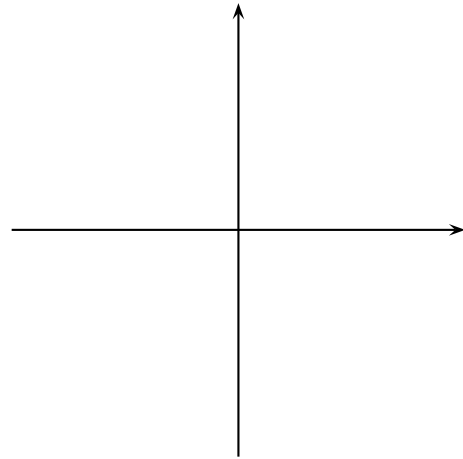
7. Solve the inequality algebraically: $\dfrac{x^2 - 4x + 1}{x + 1} \geq -1$. *(8 points)*

8. A right triangle has a side of length 4 and an angle opposite that side of measure 48°. Find the length of the hypotenuse and the other side. *(8 points)*

9. Verify the identity $\tan x + \cot x = \sec x \csc x$. *(8 points)*

10. Verify the identity $2 \cot 2x = \cot x - \tan x$ *(8 points)*

11. Approximate the values of x in the interval $[0, 2\pi)$ that solve the equation $2\sin 2x = 1.6$
    (8 points)

12. Find all values of x in the interval $[0, 2\pi)$ that solve the equation $\cos 2x = \sin x$. *(8 points)*

13. Verify the identity $\cos^4 u = \frac{3}{8} + \frac{1}{2}\cos 2u + \frac{1}{8}\cos 4u$. *(8 points)*