Problem 1  True or False. Write the word “True” or “False” next to each statement. You do not need to show your work for this question.

The function \( k(x) = \log_5(x) \) is one-to-one.  

The equation \((x + 1)^2 + (x - 4)^2 = 4\) represents a circle of radius 4 centered at the point \((-1, 4)\).

An angle with measure 30° is coterminal with an angle of measure \(-690°\).

The function \( 3a^3 - 2a^2 + 10a + 2 \) has at most 4 horizontal intercepts.

The function \( g(z) = \frac{z+1}{z+2} \) has a vertical asymptote at \( z = -1 \).

An angle that measures \( \frac{3\pi}{4} \) radians is 135° when measured in degrees.

The range of \( y = 2^{x-2} \) is all \( y > 2 \).

\( r(s) = 2 + 4s^2 - s^6 + 3s^4 \) is an even function.
Problem 2  Let \( p(y) = -2(y - 2)^2(y + 1) = -2y^3 + 6y^2 - 8. \)

What is the long-run behavior of \( p(y) \)?

What are the roots of \( p(y) \) and their multiplicities?

Sketch a graph of \( p(y) \). Your sketch needs to only show the general shape of the graph, but you must label the horizontal intercepts.
Problem 3  Solve the equation $3 \cdot (5)^{4x-1} = 12$ for $x$.

Problem 4  Solve the equation $\log_3(9a^4) = 3$ for $a$. 
Problem 5  Suppose that there is a bank account with $10000 dollars in it that earns interest at an annual rate of 10%. How much money will be in the account after 2 years?

Let $C(t)$ be a function that gives the amount of money in the account after $t$ years. What is a formula for $C(t)$?
Problem 6  Solve the equation $2y^2 - 6y - 3 = \frac{1}{2}$ for $y$. 
Problem 7 Let $g(b)$ be the function graphed in the following diagram.

What is the horizontal asymptote of $g(b)$?

What are the vertical asymptotes $g(b)$?
What are the horizontal intercepts of \( g(b) \)?

Which of the following could be a formula for \( g(b) \)? (circle one)

\[
g(b) = \frac{2(b - 1)^2(b + 4)}{(b + 1)(b + 5)(b - 2)}
\]

\[
g(b) = \frac{(b - 3)(b + 2)(b - 5)}{(b + 5)(b - 1)(b - 3)}
\]

\[
g(b) = \frac{2(b - 3)(b - 1)^2(b + 4)}{(b + 1)(b + 5)(b - 2)(b - 3)}
\]

\[
g(b) = \frac{2(b + 1)(b + 5)(b - 2)(b - 3)}{(b - 1)^2(b + 4)(b - 3)}
\]
Problem 8 Let $\theta$ be the angle in the following picture. The circle pictured has radius 4.

What is $\sin(\theta)$?

What is $\cos(\theta)$?