Question 1: (6 points) Find a polynomial \( p(x) \) of degree 3 such that 1, 2, and 4 are roots (zeros), and with \( p(0) = 32 \). (You do not need to multiply out your answer.)

Question 2: (6 points) Consider the rational function \( r(x) = \frac{7x^2 - 8x + 11}{-3x^2 + 8} \).

(a) What is the domain of \( r(x) \)?

(b) Find the horizontal asymptote of \( r(x) \) (or if there is no horizontal asymptote, state that none exists).

Question 3: (6 points) Suppose you have a bag full of nickels (5 cents each) and dimes (10 cents each) with a total of 12 coins, and the total value is 80 cents. How many of each kind of coin do you have?

Question 4: (6 points) Solve the equation for \( x \): \( \log(x + 3) - \log(x - 2) = 2 \).

Question 5: (8 points) In this problem, since you do not have a calculator, leave all answers unsimplified.

(a) Suppose you have $1000 in a bank account with a 6% annual interest rate, compounded 3 times per year. How long will it take for the amount in the bank account to reach $2700?

(b) A culture of bacteria starts with 1000 cells, and after 4 hours has 2300 cells. What is the continuous growth rate of this culture (with time measured in hours)?

Question 6: (8 points) Consider the angle \( \theta = -690^\circ \) on the unit circle.

(a) What is the point \((x, y)\) on the unit circle corresponding to this angle? (It may help to draw a sketch of this angle and re-express it as an angle between 0° and 360°.)

(b) Find the length of the circular arc of the unit circle starting at the point (1, 0) and going counter clockwise to the point in part (a).