Question 1: (6 points) Find a polynomial $p(x)$ of degree 3 such that 1, 3, and $-5$ are roots (zeros), and with $p(0) = 30$. (You do not need to multiply out your answer.)

Question 2: (6 points) Consider the rational function $r(x) = \frac{5x^2 - 8x + 11}{-2x^2 + 7}$.

(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 11 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 $x$: $\log(x + 2) - \log(x - 3) = 2$.

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 8% annual interest rate, compounded 4 times per year. How long will it take for the amount in the bank account to reach $2500?

(b) A culture of bacteria starts with 1000 cells, and after 3 hours has 2500 cells. What is the continuous growth rate of this culture (with time measured in hours)?

Question 6: (8 points) Consider the angle $\theta = -660^\circ$ 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$^\circ$ and 360$^\circ$.)

(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).