1. Rod says that he is thinking of a one variable polynomial expression that has the following characteristics:
    a. has a degree of 4
    b. has three terms
    c. one of the terms has degree 1
    d. one of the terms has a coefficient of -5
    e. has a y-intercept at 10

    What are two different polynomials that Rod could be thinking of? Are those the only possible answers? Please include an explanation or rationale with your response. **[6 marks]**

2. Create a question similar to #1 above, and provide a description of how a teacher could check that a student's response was correct. **[3 marks]**

3. Describe a function that has
    a. a domain of $\{x \in R \mid 2 \leq x \leq 10\}$, and
    b. a range of $\{y \in R \mid 5 \leq y \leq 10\}$.

    Your function does not need to be a polynomial or rational function, and it can be described algebraically, as a graph, or in another form. **[4 marks]**

4. Consider polynomial functions in the form $f(x) = ax^n + x$. Use at least three examples to investigate the relationship between a, n, and the constant finite differences. Explain the steps you took in your investigation and any conclusions you found. **[6 marks]**

5. Fully factor the following polynomials. Explain your thought process with your solution.
    a. $f(x) = 2x^3 - 25x^2 + 53x - 30$ **[3 marks]**
    b. $f(x) = x^3 + 3x - 4$ **[3 marks]**

6. Sketch the graph of the function $f(x) = -(x-4)(x+1)^2(x-5)$. Explain your thinking. **[4 marks]**

7. Solve the equation $6x^4 + x = 5x^3 + 2x^2$. **[4 marks]**

8. Describe the transformations on the quartic function $f(x) = 14[3(x-5)]^4 - 45$. **[2 marks]**

9. Determine the values of *m* and *n* for $f(x) = mx^3 + 12x^2 + nx - 3$ given that the remainder when dividing by $(x+3)$ is zero, and when divided by $(x-2)$ the remainder is 85. **[6 marks]**

10. Use algebra to determine whether the function $f(x) = 22x^3 - 19x$ is even, odd, or neither. **[4 marks]**

11. Graph the function $f(x) = -2x^2 + 2x + 4$ and its reciprocal on the same or separate axes. Explain your thinking. **[5 marks]**

12. Sketch the graph of the function $f(x) = \frac{2x+3}{x-5}$. Describe its features and their relationship with the function. **[5 marks]**

13. Solve the inequality $\frac{x-2}{x-3} \leq \frac{2x+5}{9x-7}$. Include an interval chart in your solution. **[4 marks]**

14. Solve the inequality $8x - 3 \leq 2x + 1 \leq 17x - 8$. Explain your solution in words. **[5 marks]**

15. Consider a box with dimensions 3 cm × 5 cm × 11 cm. If all of its dimensions are increased by x cm, what values of x will give a box with a volume between 300 cm^3 and 900 cm^3? You may use a graphing calculator to help you solve this question, just be sure to show your work **[6 marks]**