Math 112 Written Homework: Polynomial Functions

Name: _____

Instructor: Taryn Laird

Math 112 Section: 010

Directions: Show all work, and answer each question that is asked. Explanations should be given in complete sentences. All graphs should be drawn accurately on this sheet, and be fully labeled.

1. The U.S. consumer price index (CPI or cost of living index), has risen over the years, and can be modeled by the function $CPI(t) = -0.0023t^3 + 0.1939t^2 - 0.3962t + 28.6768$ where t is time in years since 1960. Note this is based on the average CPI=100 for years 1982-1984 (Source: Bureau of Labor Statistics).

   Graph this function in an appropriate window, label completely.

   What is the y-intercept, and what does this tell you in practical terms?

   What sales does this model predict in the year 1995? (Note that the actual CPI that year was 152.4.)

   Do you think this model can be used to predict CPIs into the future, such as in the year 2020? Why or why not?

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2. A packaging company will only accept packages for shipment if the sum of its height and perimeter of the base is not more than 120 inches.

   Write a function to represent the volume of a box with a square base, with sum of the height and perimeter of the base equal to 120 inches.

   What dimensions of such a box will give the maximum volume? What is the maximum volume?

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3. If \$800 is invested at an interest rate, r, compounded annually, the amount in the account after 4 years is given by the polynomial function $A(r) = 800(1 + r)^4$.

   Graph this function in an appropriate window.

   Describe how this function is transformed from the graph of $f(r) = r^4$.

   At what interest rate would the money need to be invested in order to yield \$1010 after 4 years? Show how this answer is represented on the graph of $y = A(r)$. Verify this result by solving for this value algebraically.