Quadratic Application/Modeling

Name: _____

The light produced by high-pressure sodium vapor streetlamps for different energy usages is shown in the table.

High-Pressure Sodium Vapor Streetlamps					
Energy Use (watts)	35	50	70	100	150
Light Output (lumens)	2250	4000	5800	9500	16000

1. Find a quadratic model for the light output with respect to energy use.

2. Use each model to predict the light output when 215 watts of energy are used.

Anthropologists use known relationships between the height and length of a woman's humerus bone, the bone between the elbow and the shoulder, to estimate a woman's height. Some samples are shown in the table.

Bone Length and Height in Women								
Humerus Length (cm)	35	27	30	33	25	39	27	31
Height (cm)	167	146	154	165	140	180	149	155

3. Find the quadratic model for the height of a woman with respect to the length of their humerus.

4. A humerus 32 cm long was found. Predict the woman's height.

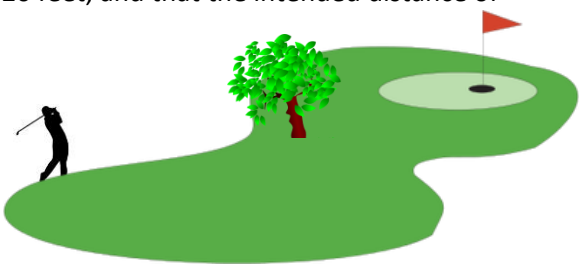
The table below lists the number of Americans (in thousands) who are expected to be over 100 years old for selected years. [Source: US Census Bureau.] (Hint: Let x = 0 for the year 1994, x = 2 for the year 1996, etc.)

5. Find the quadratic model that can be used to model the data.

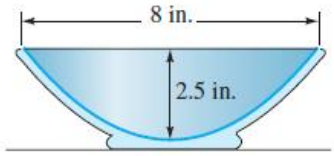
6. How many Americans will be over 100 years old in the year 2008?

Year	Number (thousands)
1994	50
1996	56
1998	65
2000	75
2002	94
2004	110

7. A golfer needs to hit a ball a distance of 500 feet, but there is a 60-foot tall tree that is 100 feet from where the shot needs to land. Given that the maximum height of the shot is 120 feet, and that the intended distance of 500 feet is reached, by how much did the ball clear the tree?



8. A soup bowl has a cross section with a parabolic shape, as shown in the figure. The bowl has a diameter of 8 inches and is 2.5 inches deep. Write an equation for its shape. How deep is the bowl 1 inch from the center?



9. The Gateway Arch in St. Louis is 630 feet tall and 630 feet wide at its base. Write the equation of a parabola that could model the Gateway Arch. The actual St. Louis Arch is in the shape of a catenary, not a parabola. The real Arch has a height of 402 feet when measured 100 feet away from the base. What is the difference in height between the real St. Louis Arch and your parabola?