After watching the video, *Exponential Growth*, complete the following problems.

1. Assume I gave you one penny on July 1st, two pennies on July 2nd, four pennies on July 3rd, etc., doubling every day.

   a. How much money would I give you on August 1st?

   b. If we wrote the equation, $y = a(1+r)^x$, where x =1 on July 1st, x = 2 on July 2nd, and so forth, find the values of a and r.

   c. What is the growth rate?

2. The video used the equation $y = a(1+r)^x$. An equivalent equation, $y = ab^x$, where $b = 1+r$ is frequently used as well.

   a. For $a = 1$ and $b > 1$, predict what will happen to a graph when the value of b changes. Try at least four different values for b.

   b. For $a > 1$ and $b = 2$, predict what will happen to a graph when the value of a changes. Try at least four different values for a.

   c. Let $b = 2$. Predict what will happen to a graph when the value of a is negative. Try several different values for a.

   d. Let $a = 1$. Predict what will happen to a graph when the value of b is negative. Try several different values for b.

3. In 1985, there were 15,948 diagnosed cases of AIDS in the United States. In 1990 there were 156,024. Scientists said that if there was no research done, the disease would grow exponentially.

   a. Compute the number of cases this model predicted for the year 2000.

   b. By the year 2000, there were 774,467 cases of AIDS. Was the prediction accurate? Discuss possible flaws in the model.