Group Work and Notes for IA 2.5: Using the power property with exponential models to make predictions

Name: **Group #**

1) How long will it take $6000, deposited into a savings account paying 3% interest compounded annually, to grow to $9917? (Assume no other deposits/withdrawals are made.)

2) Suppose that the federal debt is modeled by $f(t) = 291(1.079)^t$, where t is the number of years since 1960, and $f(t)$ is in billions of dollars. How often does the federal debt double?

3) A violent volcanic eruption and subsequent collapse of the former Mount Mazama created Crater Lake, the deepest lake in the U.S. Scientists found a charcoal sample from a tree that burned in the eruption. Part of the composition of this charcoal is carbon-14. Only 39.40% of the carbon-14 was still present in the sample when the scientists found it. How long ago did this eruption form Crater Lake? (note: the **half-life** of carbon-14 is 5730 years. This means that after 5730 years only half of the original amount of carbon-14 in a sample will remain, with the rest decaying and breaking down into different substances.)

4) Physicians use technetium-99m to locate stress fractures in bones. Technetium-99m has an effective half-life of 5.3hours – some is lost do radioactive decay and some is lost through urination. A patient with a possible stress fracture in his foot is injected with the radioactive element.

a) let $f(t)$ be the percentage of technetium-99m that remains in the patient's body at t hours since he was injected. Find an equation of f.

b) What percentage of the technetium-99m will remain after 1 day?

c) When will only 1% of the technetium-99m remain?