SCENARIO CARDS

Scenario 1	Scenario 2
Salmonella, a common bacterium on raw chicken, doubles every 25 minutes when raw chicken is at room temperature. The equation $y=(2)^{0.04t}$ models the bacteria growth of salmonella on raw chicken at room temperature, where t is time in minutes. You are a food scientist working on an important study that could help people learn how to avoid food poisoning. Determine the time it takes for a raw chicken wing that initially has 1 salmonella bacterium to reach an unsafe level of salmonella, which is 30 bacteria.	A couple years ago, you started refurbishing furniture in your free time. You liked driving your old sedan, but it was not worth the hassle every time you bought a piece of furniture and had to either pay for delivery or ask a friend to transport it for you. To make your life easier, you decided to sell your old car and then bought a brand-new Ford® F-150 truck for $30,000. The equation $y=30,000(0.9)^t$ models the value of the truck as it depreciates, where t is time in years. For how long will you be able to use the truck before you can resell it for half of what you paid for it?
Scenario 3	**Scenario 4**
In 1986, at the Chernobyl power plant in Ukraine, a reactor went into meltdown and caused an explosion that released radioactive materials, like Cesium-137, into the air. When the accident occurred, 27 kg of Cesium-137 were released. The amount of remaining Cesium-137 in the atmosphere is given by the equation $y=27e^{-0.02t}$, where t is time in years since 1986. In what year will the amount of Cesium-137 in the atmosphere be equal to 10% of what was released? ***Hint***: 10.3 years after the year 1986 is 1997.	As a researcher for the Food and Drug Administration (FDA), you play a crucial role in ensuring medicine is safe for the public and contains accurate label information. Your current assignment is to review the label for acetaminophen, commonly known as Tylenol. The prescribed dosage is 2 tablets, each containing 325 mg of acetaminophen. The amount (mg) of acetaminophen in a person's system after t hours is given by the equation $y=650\left(\frac{1}{2}\right)^{1.1t}$. If someone takes 2 tablets, how long until they have less than 1% of that dosage in their system and can safely take the next dosage?

Scenario 5	Scenario 6
You are a geography professor at OU, and your area of expertise is human geography, specifically population trends in the U.S. You need this information for a study that will help city and state governments decide where buildings, such as apartment complexes and hospitals, should be built. Use the model $y = 270e^{0.01t}$, where y is the U.S. population in millions of people, and t is time in years since 2000, to determine in what year the population will be over 350 million people. ***Hint*:** 10.3 years after the year 2000 is 2011.	You just opened a pizza restaurant and want to let your customers know how long it takes for their pizza to be ready to eat after they place an order. However, you want to make sure your customers don't burn their mouths by eating the pizza before it has cooled! You already know how long it takes to cook the pizza in your brick oven, but you need to determine how long it takes for the pizza to reach an ideal temperature of 140°F. The temperature of a pizza after leaving the oven can be modeled by $y = 700e^{-0.26t} + 90$, where t is time in minutes. Use the model to find the time it takes for your pizza to reach that ideal temperature.
Scenario 7	**Scenario 8**
You own an art studio and boutique that specializes in ceramic jewelry, home décor, and kitchenware. Recently, a customer placed a large order for 200 terracotta clay tiles that they plan to have professionally installed on their bathroom floor. To fulfill this order, you need to bake each batch of clay tiles at 2,400°F. The temperature of the tiles after they are removed from the kiln (oven) can be modeled by $y = 2400e^{-0.25t} + 75$, where t is time in hours. Determine the time it takes for each batch of tiles to reach a temperature that is safe to the touch, which is 100°F.	Your archaeologist friend brings you a piece of wood, which she claims is from a ship that sank in the War of 1812. You have the equipment to determine the current amount of carbon-14 in the wood, and you find it is 98% of what it likely had when the tree was initially cut down. Carbon-14 is a constantly renewed element in living things, including trees. After death, carbon-14 is no longer produced. The amount of carbon-14 in decaying matter can be modeled by $y = A_0e^{r \cdot t}$, where A_0 is the initial amount of carbon-14, t is time in years, and r is the rate of decay, which is -0.0001. Determine if your friend's claim is realistic.