1. Suppose an island has an initial population of 100 people, and the population doubles every 20 years. Using the exponential growth model $N(t) = N_0 e^{kt}$, how many people will be on the island in 75 years? When will the population reach 1,000,000? (Note: Round your rate k to 5 significant figures.) (Hint: To find k, start with $N(20) = 200$ and $N_0 = 100$.)

Q: What gets wet when drying?

2. An estimated world population in 2005 was 6.454 billion people, and in 2010 it was 6.972 billion people. Using the exponential model $N(t) = N_0 e^{kt}$, determine how many years it would take for the world population to double. Also, in what year will the population reach 10 billion people?

3. Suppose a population on an island doubles every 50 years. If the population is 800 people in 2015, in what year will the population reach 5,000,000 people (use the exponential growth model $N(t) = N_0 e^{kt}$)? In what year will the population reach 10,000,000 people?

4. At 12 A.M., the heater in your log cabin stops working. You look at the thermometer, and the temperature is $65^\circ F$ inside and $10^\circ F$ outside. Three hours later, the temperature in your cabin is $40^\circ F$. Assume that the outside temperature stays a constant $10^\circ F$. First, use Newton's Law of Cooling to find a function that models the temperature inside your cabin t hours after 12 A.M. Then, use the function to predict when it will be freezing in your cabin (that is, when it will be $32^\circ F$).

5. You heat some water and steep some tea. The cup of tea is $190^\circ F$. Five minutes later, the tea is $160^\circ F$. Suppose the room temperature is $60^\circ F$. First, use Newton's Law of Cooling to find a function that models the temperature of the cup of tea t minutes after your initial temperature reading. Then, use the function to predict when the tea will be $120^\circ F$.

Optional exercises from the Sullivan book if you'd like more practice:
5.8 (p.332) #1, 5, 7, 13, 14 (Answers to 14: (a) $45.41^\circ F$, (b) 16.2 min, (c) 7.26 min, (d) Temp approaches $38^\circ F$)