Composition of Functions – Word Problems

Problem 1:

In the mail, you receive a coupon for $5 off of a pair of jeans. When you arrive at the store, you find that all jeans are 25% off.

Let x represent the original cost of the jeans.

1. Write a function, f(x), that represents the effect of your original coupon.

2. Write a function, g(x), that represents the effect of the 25% discount at the store.

3. Write a function, h(x), that represents how much you would pay if you use the mail coupon first followed by applying the discount from the store. What function composition of f and g is equal to h(x)?

4. Write a function, j(x), that represents how much you would pay if you use the store discount first, followed by the mail coupon. What function composition of f and g = j(x)?

5. You find a pair of jeans for $36. How much would you pay for it using h(x)? How much would you pay using j(x)? Which function composition is going to give you a better discount?

Problem 2:

A perfectly spherical balloon is being filled with air. The radius increases at a rate of 3 in/sec. We can express the radius of the balloon as the function $R(t) = 3t$, where t represents time in seconds. We can also express the volume of the balloon as the function $V(r) = (4/3)\pi r^3$, where r represents the radius in inches.

a. What is the **meaning** of the composition V(R(t))?

b. What would be the volume of the balloon after 3 seconds?

Problem 3:

The number N of bacteria in a refrigerated food is given by $N(T) = 20T^2 - 80T + 500$, where T is the temperature of the food in degrees Celsius. When the food is removed from refrigeration, the temperature of the food is given by $T(h) = 4h + 2$, where h is the time in hours. Find a function for the number of bacteria in terms of the number of hours that pass. Be sure to simplify your answer!