Mathematics 122 Quiz #23 Name: _____

Just to do something different, and hopefully at least a little bit fun, this will be a group quiz and be worth 10 points.

1. A cup of coffee at 90°C is put into a 20°C room when $t = 0$. If the coffee's temperature is changing at a rate given in °C per minute by

$$r(t) = -7(0.9^t), \qquad t \text{ in minutes},$$

estimate, to one decimal place, the coffee's temperature when $t = 10$.

2. Water is leaking out of a tank at a rate of $R(t)$ gallons/hour where t is measured in hours.
   (a) Write a definite integral that express the total amount of water that leaks out in the first two hours.

   (b) The graph of $R(t)$ is below. Shade the region whose area represents the total amount of water that leaks out in the first two hours.

   (c) Give upper and lower estimates for the total amount of water that leaks out in the first two hours.