7. [10 points] Note that the situations described in parts **a.** and **b.** on this page are not related to each other.

a. [6 points] A dose of a total of 1.2 milliliters of a drug is injected into a patient steadily for 0.3 seconds. At the end of this time, the quantity of the drug in the body starts to decay exponentially, decreasing by 0.18 percent per second. Let $Q(t)$ be the quantity of the drug in the body, in milliliters, t seconds after the injection begins.

The function $Q(t)$ can be described using a piecewise-defined formula, as shown below. Use the description above to fill in the four answer blanks provided below with appropriate formulas and bounds so that the function $Q(t)$ is continuous for all $t > 0$.

Answer:
$$Q(t) = \begin{cases} \underline{\quad 4t \quad} & \text{if } 0 < t \le \underline{\quad 0.3 \quad} \\ \\ \underline{\quad 1.2(0.9982)^{t-0.3} \quad} & \text{if } \underline{\quad 0.3 \quad} < t. \end{cases}$$

b. [4 points] Suppose that someone studying parking habits at U-M during the 2015-16 school year makes the following statement:

"During this school year, the number of cars that arrive on campus before 8 am has increased by 25% every thirty days."

Let $C(d)$ be the number of cars that arrive on campus before 8 am on the dth day of the school year. Which of the formulas below model the situation described in the quote above, where K is some positive constant? (Circle <u>all</u> correct answers. Or circle NONE OF THESE.)

$C(d) = K(0.25)^{d/30}$	$C(d) = K(1.25/30)^d$	$C(d) = K + (0.25/30)^d$
$\boxed{C(d) = K(1.25)^{d/30}}$	$\boxed{C(d) = K(0.8)^{-d/30}}$	$C(d) = K + (1.25/30)^d$
$C(d) = Ke^{1.25d}$	$C(d) = K(4)^{-d/30}$	$C(d) = K + 0.25d$
$C(d) = Ke^{0.25d}$	$C(d) = Kd^{1.25}$	$C(d) = K + 0.25d/30$
$\boxed{C(d) = Ke^{\ln(1.25)d/30}}$	$C(d) = Kd^{0.25}$	$C(d) = 1.25\sin(\frac{\pi d}{15}) + K$
$C(d) = Ke^{\ln(0.25)d/30}$	$C(d) = K + (0.25)^{d/30}$	$C(d) = 1.25\cos(\frac{\pi d}{15}) + K$
$C(d) = K(0.25/30)^d$	$C(d) = K + (1.25)^{d/30}$	NONE OF THESE