1. (2 points each) Circle “True” or “False” for each of the following problems. Circle “True” only if the statement is always true. No explanation is necessary.

(a) Suppose that a differentiable function $h$ and its derivative, $h'$, are continuous. If $h'(x) < 0$ for all $a \leq x \leq b$ then every left-hand sum estimate of $\int_a^b h(x)\,dx$ will be an overestimate.

   True \hspace{1cm} False

(b) For $f(x)$ a continuous function, $\int_{-1}^{1} f(x)\,dx = 2 \int_{0}^{1} f(x)\,dx$.

   True \hspace{1cm} False

(c) If $\int_{0}^{3} f(x)\,dx = 5$, then $\int_{0}^{3} 3f(x)\,dx = 15$.

   True \hspace{1cm} False

(d) If $Z(t)$ is an anti-derivative for $z(t)$, then $Z(t + 5)$ is also an anti-derivative for $z(t)$.

   True \hspace{1cm} False

2. (3 points each) Explain in words what the following represent:

(a) $\int_{2}^{6} f(t)\,dt$ where $f(t)$ is the rate at which people are lining up outside of Target waiting for the store to open at 6 am, where $t$ is in hours after midnight on the day after Thanksgiving,

   $\int_{2}^{6} f(t)\,dt$ is the total number of people who line up between 2:00 AM and 6:00 AM.

(b) $\int_{0}^{4} a(t)\,dt$ where $a(t)$ is acceleration of an object in ft/sec$^2$ and $t$ is in seconds

   $\int_{0}^{4} a(t)\,dt$ is the total change in velocity (in feet per second) of the object between the times $t = 0$ and $t = 4$.

(c) $\frac{1}{4} \int_{5}^{9} r(t)\,dt$ where $r(t)$ is rainfall in inches per hour and $t$ is in hours since noon

   $\frac{1}{4} \int_{5}^{9} r(t)\,dt$ is the average rainfall (in inches per hour) between 5:00 PM and 9:00 PM.