AP Calculus AB **Name:**

Quarter Exam Review – What does it mean?!

1. The rate of potato consumption in a country is $C(t)$ millions of bushels per year, with t being years since the beginning of 1970. What does $\int_2^4 C(t)\,dt$ represent?

   The number of millions of bushels of potatoes consumed from 1972 to 1974.

2. The rate at which a pump removes water is given by $R(t)$ gallons per minute. What does $\int_0^{60} R(t)\,dt$ represent?

   The number of gallons of water removed in the first 60 minutes.

3. The rate at which your home consumes electricity is measured in kilowatts. Suppose that the consumption rate for a certain home is modeled by the function $K(t)$, where t is the number of hours past midnight. What does $\int_3^7 K(t)\,dt$ represent?

   The number of kilowatt hours consumed between 3AM and 7AM.

4. Midday traffic through an intersection can be modeled by the function $T(t)$ cars per minute, where t is measured in minutes after noon.

   a. What does $\int_0^{30} T(t)\,dt$ represent?

   The number of cars that pass through an intersection between noon and 12:30p

   b. What does $\frac{1}{30}\int_0^{30} T(t)\,dt$ represent?

   The average number of cars/minute that pass through the intersection from noon to 12:30p.

5. The rate of consumption of oil in the United States during the 1980s (in billions of barrels per year) is modeled by the function $B(t)$, where t is the number of years after 1980.

   a. What does $\int_5^{15} B(t)\,dt$ represent?

   The number of billions of barrels consumed between 1985 and 1995

   b. What does $\frac{1}{10}\int_5^{15} B(t)\,dt$ represent?

   The average number of billions of barrels / year between 1985 and 1995.

6. The rate at which people enter an amusement park at time t is given by $E(t)$. The rate at which people leave an amusement park at time t, in hours, is given by $L(t)$. Let t be in hours past noon. There are 400 people inside the park at noon.

   a. What does $\int_0^{10} E(t)\,dt$ represent?

   The number of people who enter the park from noon until 10p.

   b. What does $\int_0^{10} L(t)\,dt$ represent?

   The number of people who leave the park from noon until 10p.

   c. Write a calculation that computes the number of people in the park at 10 pm.

   $400 + \int_0^{10} E(t)\,dt - \int_0^{10} L(t)\,dt = 400 + \int_0^{10} E(t) - L(t)\,dt$

7. The velocity of a particle moving along the x-axis is given by $v(t)$ where t is measured in seconds.

   a. What does $\int_1^3 v(t)\,dt$ represent?

   The change in position between 1 and 3 s.

   b. What does $\frac{1}{2}\int_1^3 v(t)\,dt$ represent?

   The average velocity between 1 and 3s.

   c. What does $\int_1^3 |v(t)|\,dt$ represent?

   The distance travelled between 1 and 3s.

   d. Let the particle's position be 5 at $t = 1$. What does $5 + \int_1^3 v(t)\,dt$ represent?

   The position of the particle after 3 s.

8. A car moving with initial velocity of 5 miles per hour has given by $a(t)$ mph per second.

   a. What does $\int_0^8 a(t)\,dt$ represent?

   The change in velocity from 0 to 8 s.

   b. What does $5 + \int_0^8 a(t)\,dt$ represent?

   The velocity after 8 s.