AP Calculus AB

7.1 Review Opener

1. A rubber ball is dropped from a certain height, and it begins to bounce straight up and down. Let v(t) represent the velocity of the rubber ball (in feet per second) *t* seconds after it was dropped. For each of the following equations, write a complete sentence explaining the significance of the information with respect to the ball's movement, including correct units.

   a) $v(4) = -10$ Four seconds after being dropped, the ball was falling at 10 ft/second.

   b) $\int_0^6 v(t)\,dt = 12$ The ball was 12 feet higher after 6 seconds than it was when dropped. (the rubber is patent pending ☺)

   c) $v'(11) = -32$ Eleven seconds after being dropped, the acceleration of the ball was 32 feet per second squared in the downwards direction.

   d) $\int_0^6 |v(t)|\,dt = 53$ The ball travelled a total distance of 53 feet during the first six seconds.

   e) $\int_3^{13} v'(t)\,dt = 4$ The ball's velocity was 4 feet/second greater after 13 seconds than it was after 3 seconds.

2. Let $g(t)$ represent the rate at which a stalk of swamp-grass is growing, measured in cm/day, where t represents the number of days since the stalk was planted (assume that the seedling was 2 cm tall when it was planted). Write an expression for each of the following. Indicate the units of measure for each expression.

   a) The rate at which the stalk is growing after 4 weeks have passed. $g(28)$ cm/day

   c) The average rate at which the stalk grew over the first 4 weeks. $\frac{1}{28}\int_0^{28} g(t)dt$ cm/day

   d) The amount that the stalk grew over the first 4 weeks. $\int_0^{28} g(t)dt$ cm

   b) The height of the stalk after 4 weeks. $2 + \int_0^{28} g(t)dt$ cm

3. The function $w(t)$ models the rate at which the population of Wilsonburg is growing (in people per year), where *t* is measured in years since January 1st, 2010. If the population of Wilsonburg was 30,000 people at the beginning of 2012, Write an expression involving an integral for the population of the city at the beginning of 2016. $30{,}000 + \int_2^6 w(t)\,dt$ people