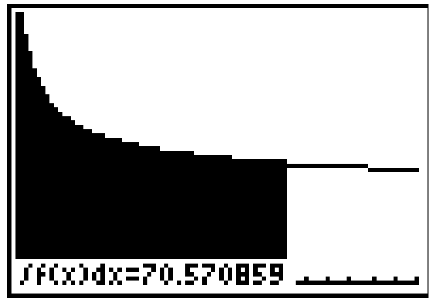
2003 Form B AB2



A. $\int_0^{12} H(t)dt = 70.570 \text{ or } 70.571$

B. Let F be defined as a new function such that

$F(t) = \int \left(H(t) - R(t)\right)dt$

Therefore $F'(t) = H(t) - R(t)$

$F'(6) = H(6) - R(6) = -2.924 < 0$ So the tank is emptying at time t = 6 since the derivative of F is negative.

C. $A(t) = 125 + \int_0^t \left(H(t) - R(t)\right)dt$

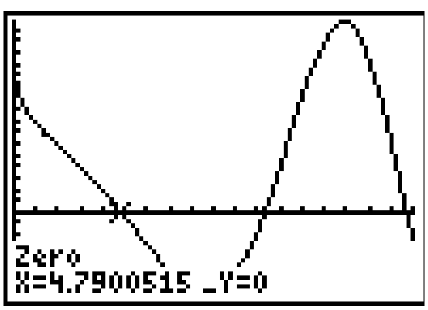
$A(12) = 125 + \int_0^{12} \left(H(t) - R(t)\right)dt = 122.025 \text{ or } 122.026 \text{ gallons}$

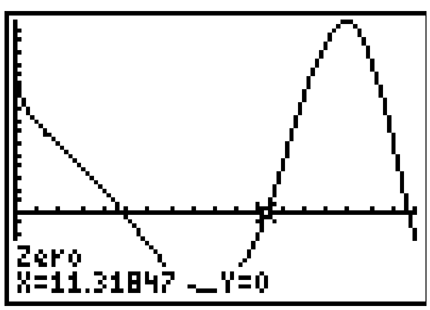
D. To find out when the amount is least we need to first find the zeros of the derivative of A and find when the derivative equals zero to find all critical values.

$A(t) = 125 + \int_0^t \left(H(t) - R(t)\right)dt$

$\therefore A'(t) = H(t) - R(t)$

Graphically the two zeros are x = 4.790 and 11.318 The graphs are also graphs of A' so A in increasing from (0, 4.790) decreasing from (4.790, 11.318) and increasing from (11.1318, 17.707) so absolute minimums must occur at t = 0 or t = 11.318. A(0)=125





$A(11.318) = 125 + \int_0^{11.318} \left(H(t) - R(t)\right)dt = 120.738$ So level is

minimum at t = 11.318.