1) a) $R'(2) \approx \frac{R(3)-R(1)}{3-1} = \frac{950-1190}{2}$ liters/hr/hr

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b) $[1(1340)+2(1190)+3(950)+2(740)]$

liters

overestimate, because $R(t)$ is a decreasing function and we used the Left Reimann sum

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c.) 8,050 liters from part b

$$50{,}000 - 8{,}050 + \int_0^8 w(t)\,dt$$

$$= 49786$$ liters

(d) Amount of water in tank = $A(t)$

$$A(t) = 50{,}000 + \int_0^t (w(t) - R(t))\,dt$$

$$A'(t) = w(t) - R(t)$$

$$0 = w(t) - R(t) \text{ or } R(t) = w(t)$$

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(2) (a) $v(4) = 2.979$

$$a(t) = v'(t)$$

$$a(4) = -1164$$

at $t = 4$, the particle is slowing down because a(4) and v(4) are opposite signs

(b) $v(t) = 0$

at $t = 2.707$, $v(t)$ changes + to −

(c) $x(0) + \int_0^4 v(t)\,dt = x(4)$

$x(0) = x(4) - \int_0^4 v(t)\,dt = -3.815$

(d) $\int_0^3 |v(t)|\,dt = 5.301$