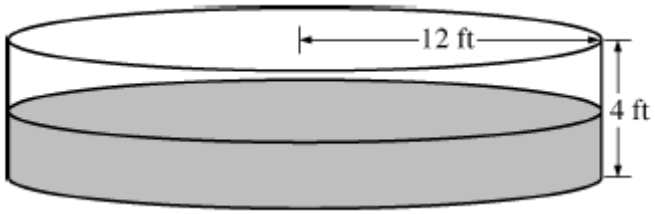
AB/BC 3

t	0	2	4	6	8	10	12
$P(t)$	0	46	53	57	60	62	63



At $t = 0$, the pool contains 1000 ft^3 of water. Water pumped in at $P(t)$ $\frac{ft^3}{hour}$.

Water leaking out at $R(t) = 25e^{-0.05t} \frac{ft^3}{hour}$.

(a) The midpoint Riemann sum is $4P(2) + 4P(6) + 4P(10) = 4 \cdot (46 + 57 + 62) = \boxed{660\ ft^3}$

(b) The amount of water leaked out = $\int_0^{12} R(t)dt \approx \boxed{224.594\ ft^3}$

(c) Volume = the initial amount plus the amount added less the amount leaked out.
So, the volume $\approx 1000 + 660 - 225.594 = 1434.406 \approx \boxed{1434\ ft^3}$

(d) Let V(t) be the volume of water in the pool at time t. The volume of water in the pool is increasing at time $t = 8$ at V'(8).

$$V'(8) = P(8) - R(8) \approx 60 - 16.758 = \boxed{43.242 \frac{ft^3}{hour}}$$

$V = \pi r^2 h = 144\pi h$, so $V'(t) = 144\pi \frac{dh}{dt} \Rightarrow \frac{dh}{dt} = \frac{V'(t)}{144\pi}$. Therefore,

$$\left.\frac{dh}{dt}\right|_{t=8} \approx \frac{43.242}{144\pi} \approx \boxed{0.096 \frac{ft}{hour}}$$