

79. A device contains two components. The device fails if either component fails. The joint density function of the lifetimes of the components, measured in hours, is $f(s, t)$, where $0 < s < 1$ and $0 < t < 1$.

What is the probability that the device fails during the first half hour of operation?

(A)
$$\int_0^{0.5} \int_0^{0.5} f(s, t) \, ds \, dt$$

(B)
$$\int_0^1 \int_0^{0.5} f(s, t) \, ds \, dt$$

(C)
$$\int_{0.5}^1 \int_{0.5}^1 f(s, t) \, ds \, dt$$

(D)
$$\int_0^{0.5} \int_0^1 f(s, t) \, ds \, dt + \int_0^1 \int_0^{0.5} f(s, t) \, ds \, dt$$