$\cancel{fa}$ $M = \{(x_1, x_2);\ 0 \le x_1 \le \frac{1}{2x_2} \le 2\}$

$[0, \frac{1}{2x_2}]$ $\quad f_1(x_1) = \begin{cases} \frac{1}{2}, & 0 \le x_1 \le \frac{1}{2x_2} \\ 0, & \text{sonst} \end{cases}$

$[x_1, 2]$ $\quad f_2(x_2 | x_1) = \begin{cases} \frac{1}{2-x_1}, & x_1 \le \frac{1}{2x_2} \le 2 \\ 0, & \text{sonst} \end{cases}$

$\Leftrightarrow f(x_1, x_2) = \frac{1}{2(2-x_1)}$;

$q_1 = \int_0^2 \frac{1}{2(2-x_1)} \left(\int_0^{\frac{1}{4}} dx_2 \right) dx_1$

$= \frac{1}{8} \int_0^2 \frac{1}{2-x_1} dx_1 = \frac{1}{8} \cdot \left[(-1) \ln|2-x_1| \right]_0^2$

$= -\frac{1}{8} \ln|0| + \frac{1}{8} \ln|2| = \underline{\frac{1}{8} \ln|2|}$.

$q_2 = \int_0^2 \frac{1}{2} \left(\int_0^2 \frac{1}{2-x_1} dx_1 \right) dx_2$

$= \int_0^2 \frac{1}{2} \cdot \frac{1}{8} \left[(-1) \ln|2-x_1| \right]_0^2 dx_2 = \int_0^2 \frac{1}{16} \ln|2| \, dx_2$

$\cancel{= \frac{1}{16} \left[(2-x_1) \ln|2-x_1| - 2 + x_1 \right]_0^2}$

$= \frac{1}{16} \ln|2| \cdot 2 = \underline{\frac{1}{8} \ln|2|}$. $\Leftrightarrow \underline{q_1 + q_2 = q = 0.173.}$