In the solution I distributed in class, I made a mistake for part (b), and so I’ll just give the correct solution for that part here.

The desired probability is

\[ P(XY = 0) = P(\{X = 0\} \cup \{Y = 0\}) \]
\[ = P(X = 0) + P(Y = 0) - P(\{X = 0\} \cap \{Y = 0\}) \]
\[ = e^{-2} + 4^{-10} - e^{-2}4^{-10} \]
\[ \approx 0.135. \]