43. Solution: D

If a month with one or more accidents is regarded as success and $k =$ the number of failures before the fourth success, then k follows a negative binomial distribution and the requested probability is

$$\Pr[k \geq 4] = 1 - \Pr[k \leq 3] = 1 - \sum_{k=0}^{3} \binom{3+k}{k} \left(\frac{3}{5}\right)^4 \left(\frac{2}{5}\right)^k$$

$$= 1 - \left(\frac{3}{5}\right)^4 \left[\binom{3}{0}\left(\frac{2}{5}\right)^0 + \binom{4}{1}\left(\frac{2}{5}\right)^1 + \binom{5}{2}\left(\frac{2}{5}\right)^2 + \binom{6}{3}\left(\frac{2}{5}\right)^3\right]$$

$$= 1 - \left(\frac{3}{5}\right)^4 \left[1 + \frac{8}{5} + \frac{8}{5} + \frac{32}{25}\right]$$

$$= 0.2898$$

Alternatively the solution is

$$\left(\frac{2}{5}\right)^4 + \binom{4}{1}\left(\frac{2}{5}\right)^4 \frac{3}{5} + \binom{5}{2}\left(\frac{2}{5}\right)^4 \left(\frac{3}{5}\right)^2 + \binom{6}{3}\left(\frac{2}{5}\right)^4 \left(\frac{3}{5}\right)^3 = 0.2898$$

which can be derived directly or by regarding the problem as a negative binomial distribution with

i) success taken as a month with no accidents

ii) $k =$ the number of failures before the fourth success, and

iii) calculating $\Pr[k \leq 3]$