SW-1.35a) Pr[success to all N receivers in one attempt] = p^N

Pr[unsuccessful to all N receivers in one attempt] = $1-p^N$

$$\begin{aligned}\Pr[\text{success at } m=2] &= \Pr[\text{success at } m=2 \mid \text{not at } m=1]\Pr[\text{not at } m=1] \\ &\quad + \Pr[\text{success at } m=2 \mid \text{success at } m=1]\Pr[\text{success at } m=1] \\ &= p^N(1-p^N) + 0\cdot p^N \\ &= p^N(1-p^N)\end{aligned}$$

generalizing...

$$\Pr[\text{success at } m] = p^N(1-p^N)^{m-1}$$

$$\Pr[\text{success at} \leq m] = \sum_{n=1}^{m} p^N(1-p^N)^{n-1}$$

these are equal

—OR—

$$\begin{aligned}\Pr[\text{success at} \leq m] &= 1 - \Pr[\text{no success at} \leq m] \\ &= 1-(1-p^N)^m\end{aligned}$$

b) For each receiver, success in exactly m intervals occurs with probability $p(1-p)^{m-1}$, which can be seen via

m	probability
1	p
2	$p(1-p)$
3	$p(1-p)^2$
⋮	⋮

Thus success in $\leq m$ intervals occurs with probability $\sum_{n=1}^{m} p(1-p)^{n-1}$

For N independent receivers, this becomes

$$\left[\sum_{n=1}^{m} p(1-p)^{n-1}\right]^N$$

—OR—

$$\begin{aligned}\Pr[\text{success for a receiver in} \leq m \text{ intervals}] &= 1 - \Pr[\text{no success in} \leq m \text{ intervals}] \\ &= 1-(1-p)^m\end{aligned}$$

For N independent receivers, this becomes

$$\left[1-(1-p)^m\right]^N$$