Ex. 3.37 (page 132)

P(a couple accepts) = 0.20

P(15 couples are interviewed to recruit 5)

$z = 15,\ r = 5,\ p = 0.20$

$$nb(15; 5, 0.20) = \underbrace{{}_{(15-1)}C_{(5-1)}}(0.20)^5(0.80)^{15-5}$$

$${}_{14}C_4 = \frac{14!}{4!\,(14-4)!}$$ (formula on pg. 72)

$$= \frac{\overset{7}{\cancel{14}} \times 13 \times \cancel{12} \times 11 \times \cancel{10!}}{\underbrace{\cancel{4} \times \cancel{3} \times \cancel{2}}_{4!} \times \cancel{10!}}$$

$$= 7 \times 13 \times 11 = 1001$$

$$nb(15; 5, 0.20) = (1001) \times (0.20)^5 (0.80)^{10}$$

$$= (1001) \times (0.00032)(0.107374)$$

$$= 0.034394098$$

P(successful rocket launch) = 0.95

P(3rd failure occurs at the 8th launch)

$$nb(8; 3, 0.05) = {}_{(8-1)}C_{(3-1)} (0.05)^3 (0.95)^5$$

$$\binom{8-1}{3-1} = \binom{7}{2} = \frac{7 \times {}^{3}\cancel{6} \times \cancel{(5 \times 4 \times 3 \times 2)}}{\cancel{2}!\ \underbrace{(7-2)!}_{\cancel{5}!}} = 21$$

$$nb(8; 3, 0.05) = 21 \times 0.000125 \times (0.773780938)$$
$$= 0.002031175$$

Hypergeometric Distr. Example.

Lots of size 200. p(defective) = 0.02

$n = 25$ $N = 200$ $M = (200)(0.02)$
$M = 4$

(a) P_1(having 0 defective in our sample)
+
P_2(having 1 defective unit in our sample)

= P(Accepting the tested lot)

$$P_1 = \frac{\binom{4}{0}\binom{196}{25}}{\binom{200}{25}} = 0.583643\ldots$$

$$P_2 = \frac{\binom{4}{1}\binom{196}{24}}{\binom{200}{25}} = 0.339327\ldots$$

$\boxed{P_1 + P_2 = 0.922970 49}$