Homework #4 solutions: MA 204

**3.22** (1)

$$\begin{aligned} P(\text{at least one 6 in six rolls}) &= 1 - P(\text{no 6's in 6 rolls}) \\ &= 1 - (5/6)^6 \\ &= 0.66 \end{aligned}$$

(2)

$$\begin{aligned} P(\text{at least two 6's in twelve rolls}) &= \\ &= 1 - P(\text{no 6's in 12 rolls}) - P(\text{one six in 12 rolls}) \\ &= 1 - (5/6)^{12} - \binom{12}{1}(1/6)^1(5/6)^{11} \\ &= 1 - pbinom(1, 12, (1/6)) \\ &= 0.62 \end{aligned}$$

(3)

$$\begin{aligned} P(\text{at least three 6's in eighteen rolls}) &= \\ &= 1 - P(\text{no 6's, one 6, or two 6's in 18 rolls}) \\ &= 1 - (5/6)^{18} - \binom{18}{1}(1/6)^1(5/6)^{17} - \binom{18}{2}(1/6)^2(5/6)^{16} \\ &= 1 - pbinom(2, 18, (1/6)) \\ &= 0.597 \end{aligned}$$

Therefore, at least one 6 in six tosses of the die is most likely