M 362K Pre-Class Work for 2/26

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4-3

For option (b), the total number of grains of rice is $2+2^2+2^4+\cdot+2^63 == 2^{64}-1 > 1000000000$

Therefore option (b) is better

4-6

(a)

The probability for each outcome is equal, which is $\frac{1}{6}$

$\therefore Pr(X \geq 5) = Pr(X = 5) + Pr(X = 6) = \frac{1}{3}$

(b)

$mean = E[X] = \frac{1+6}{2} = 3.5$

(c)

$median = \frac{3+4}{2} = 3.5$

(d)

$Var[X] = \frac{6^2-1}{12} = \frac{35}{12}$

$\sigma = \sqrt{Var[X]} = \sqrt{\frac{35}{12}} = 1.70783$

4-14

Let n denote the total number of throws. Let p denote probability of success

$E[M] = n * p = 12 * 0.8 = 9.6$

$Var[M] = n * p * (1 - p) = 12 * 0.8 * 0.2 = 1.92$

$Pr(M \leq 10) = 1 - Pr(M > 10) = Pr(M = 11) + Pr(M = 12) = 1 - {}_{12}C_{11} 0.8^{11} * 0.2^1 + 0.8^{12} =$

0.7251

4-17

$Pr(X = 1) = {}_3C_1 0.9 * 0.1^2 = 0.027$

$Pr(X \geq 2) = Pr(X = 2) + Pr(X = 3) = {}_3C_2 0.9^2 * 0.1 + 0.9^3 = 0.972$

$E[X] = n * p = 3 * 0.9 = 2.7$

$Var[X] = n * p * (1 - p) = 3 * 0.9 * 0.1 = 0.27$