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Course: 01:198:206 (04:18156) Section 4 Spring 2020

Homework 4

Answer to question 1

Part a:

We choose two boards out of five that can be done by 5 choose 2

Probability of breaking 2 out of 5 boards = $\binom{5}{2} * 0.8^2 * 0.2^3$= **0.0512**

Part b:

Probability of breaking 4 boards = $\binom{5}{4} * 0.8^4 * 0.2^1$ = 0.4096

Probability of breaking 5 boards = $\binom{5}{5} * 0.8^5 * 0.2^0$ = 0.328

Then,

Probability of breaking at most 3 boards = 1 – Probability of breaking 4 or 5 boards =

1 - $\binom{5}{4} * 0.8^4 * 0.2^1 - \binom{5}{5} * 0.8^5 * 0.2^0$ = **0.263**

Part c:

p = 0.8

n = 5

E(boards he will break) = pn = 0.8*5 = **4**

Answer to question 2

Part a

E(days for one problem) = (1 * 2/3) + (2 * 1/3) = 4/3

E(B) = 3 * E (days for one problem) = 3 * 4/3 = **4 days**

Part b

Probability of getting 1 = 1/6

Probability of not getting 1 = 5/6

Considering doing laundry as a failure then E(days to failure) = 1/(1/6) = 6 days

Since day 6 will be the day of laundry then E(delays laundry) = 6-1 = **5 days**

Part c

E(one dice roll) = 1/6*1 + 1/6*2 + 1/6*3 + 1/6*4 + 1/6*5 + 1/6*6 = 7/2

E(product from two dice roll) = 7/2 * 7/2 = 49/4 = **12.25**

Part d

E(D) = $\frac{1}{2} * E(B) + \frac{1}{3} * E(R) + \frac{1}{6} * E(N) = \frac{1}{2} * 4 + \frac{1}{3} * 5 + \frac{1}{6} * \frac{49}{4} = \frac{137}{24} = \mathbf{5.71}\ \boldsymbol{days}$

Answer to question 3

Part a

For 2 point 10 true/false:

E(true in 10) = ¾ * 10 = 7.5

E(credit for 10) = 7.5 * 2 = **15**

For 15 points 4 question:

E(one dice roll) = 1/6*1 + 1/6*2 + 1/6*3 + 1/6*4 + 1/6*5 + 1/6*6 = 7/2

E(sum from two dice roll) = 7/2 + 7/2 = 7

E(credit for 15 point question) = 7+3 = 10

E(credit for four 15 point questions) = 10 * 4 = **40**

For 20 single point questions:

E(credit for 20) = ½ * 12 + ½ * 18 = **15**

E(score graded by TA) = 15+40+15 = 70

Part b

E(one dice roll) = 1/6*1 + 1/6*2 + 1/6*3 + 1/6*4 + 1/6*5 + 1/6*6 = 7/2

E(product from two dice roll) = 7/2 * 7/2 = 49/4 = 12.25

E(general impression score) = 4/10*40 + 3/10*50 + 3/10*60 = 49

E(score graded by prof) = 49 + 12.25 = 61.25

Part c

E(score on final) = P(ta)*E(ta) + P(prof)*E(prof) + P(random)*84

= 4/7*70 + 2/7*61.25 + 1/7*84 = **69.5**