

Sixth homework set

Due at the beginning of class on Thursday, Nov 12. No late homework will be accepted.

Fold your homework paper vertically and PRINT your name on the outside.

1. Suppose we build a randomized gasket with these scalings:

$$r_1 = \begin{cases} 1/3 & \text{with prob } 1/2 \\ 1/9 & \text{with prob } 1/2 \end{cases}$$

$$r_2 = \begin{cases} 1/3 & \text{with prob } 1/4 \\ 1/9 & \text{with prob } 3/4 \end{cases}$$

$$r_3 = \begin{cases} 1/3 & \text{with prob } 1/8 \\ 1/9 & \text{with prob } 7/8 \end{cases}$$

(a) Find the exact maximum and minimum values of the dimension of this gasket. Justify your answer.

(b) Find the exact expected value of the dimension of this gasket.

(c) Is the expected value of the dimension closer to the minimum or to the maximum possible value of the dimension? To compare these dimensions, find a numerical approximation of the answer of (b). Carry three digits to the right of the decimal. Using the probabilities of the scaling factors, explain why your answer makes sense.

2. Suppose a finance cartoon has clock time increments $dt_1 = dt_2 = dt_3 = dt_4 = dt_5 = dt_6 = 1/6$ and price increments $dY_1 = 1/4$, $dY_2 = 1/2$, $dY_3 = -1/4$, $dY_4 = 1/2$, $dY_5 = -1/4$ and $dY_6 = 1/4$.

Find the exact values of the trading time increments dT_1 , dT_2 , dT_3 , dT_4 , dT_5 , and dT_6 . Your answers should NOT contain logarithms.