Math 5411 – Mathematical Statistics I– Fall 2024
w/Nezamoddini-Kachouie

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Homework #1 – September 2, 2024

#1 Write the sample space of rolling two dice.

The sample space, S, of rolling two dice is

$$S = \{(1,1),(1,2),(1,3),(1,4),(1,5),(1,6)$$
$$(2,1),(2,2),(2,3),(2,4),(2,5),(2,6)$$
$$(3,1),(3,2),(3,3),(3,4),(3,5),(3,6)$$
$$(4,1),(4,2),(4,3),(4,4),(4,5),(4,6)$$
$$(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)$$
$$(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\}$$
$$|S| = 36$$

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#2 Calculate the probabily of traffic light experiement from school to home.

Stop lights between home and school

Data Collection – Stop lights south on Babcock Street:

s_1 = Florida Ave

s_2 = Eber Blvd

s_3 = Palm Bay Rd

s_4 = Port Malabar Rd

s_5 = Port Malabar Blvd

s_6 = Malabar Rd

Each of these is a Bernouli Trial and has a 50-50 chance ($p(s_n) = 0.5$), $\forall n \in \{1,2,3,4,5,6\}$) of success. Thus, the sample space, S, will consist of elements which are 6-tuples that can either be s-stop or c-continue. An example of one such element is "$ssccss$". The cardinality or size of this set is $|S| = 2^6 = 64$ elements.

A = No Stops
   $A = \{cccccc\}$, $|A| = 1$, $p(A) = |A|/|S| = 1/64$

B = No more than two stops.
   The sum of 'no stops' (1), 'exactly one stop' (6) and 'exactly two stops' (5+4+3+2+1=15).

$$B = \{cccccc, sccccc, cscccc, ccsccc, cccscc, ccccsc, cccccc,$$
$$sscccc, scsccc, sccscc, scccsc, sccccs, cssccc, cscscc,$$
$$csccsc, cscccs, ccsscc, ccscsc, ccsccs, cccssc, cccscs, ccccss\}$$
$$|B| = 22$$
$$p(B) = |B|/|S| = 22/64 = 11/32$$