

Durham University
MATH1541 Statistics
Exercise Sheet 10 (Week 13)

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1 Q1

1.1 a)

$$S = \{H, T\}$$

1.2 b)

$$S = \{1, 2, 3, 4, 5, 6\}$$

1.3 c)

$$S = \{(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)\}$$

2 Q3

2.1 a)

$$P(\text{Tan}) = 0.1$$

2.2 b)

2.2.1 i.

$$P(\text{Brown or Red}) = P(\text{Brown}) + P(\text{Red}) = 0.5$$

2.2.2 ii.

$$P(\text{Yellow}^c) = 0.8$$

2.2.3 iii.

$$1 - (P(\text{Orange}) + P(\text{Tan})) = 0.8$$

2.2.4 iv.

1

3 Q5

If we're assuming Die 1 has 6 sides labeled 1 to 6, then it is invalidly described as each outcome would, in reality, have a non-zero probability.

Die 4 is invalidly described because probabilities cannot be negative.

4 Q6

5 Q8

$$C \sim B(10, \frac{1}{3})$$

$$P(C \geq 1) = 1 - P(C = 0) = 1 - 0.1734 = 0.8266$$

6 Q17

6.1 a)

False positive - a positive test reaction when administered on a person without cancer C ($P(T^+|C^-)$)

False negative - a negative test reaction when administered on a person with cancer C ($P(T^-|C^+)$)

6.2 b)

6.3 c)

6.4 d)

6.5 e)

6.6 f)

6.7 g)

6.8 h)