

Name: _____
MAT 121
Summer 2019
Homework 4

*“And that our greatest accomplishments
cannot be behind us, because our destiny
lies above us.”*

– Cooper, Interstellar

Problem 1: Explain what is wrong with the following:

(a) $P(A) = 1.1$

(b) $P(B) = -0.2$

Problem 2: Explain what the Law of Large Numbers says.

Problem 3: You have flipped a coin 50 times, and it has landed heads up each of these times. This means that the sample probability of heads is 100%. What does the Law of Large Numbers say (or does not say) about there being a tails in the next few flips.

Problem 4: Turn the following mathematical statements into English sentences:

A = collection of all blue objects

B = collection of all square objects

(a) $\bar{A} =$

(b) $A \cup B =$

(c) $A \cap B =$

(d) $P(A) =$

(e) $P(A | B) =$

(f) $P(\bar{A}) =$

(g) $P(A \cap \bar{B}) =$

Problem 5: Explain the difference between the word 'or' in Mathematics and how it is used in everyday life.

Problem 6: Explain what could be wrong with the following: $P(A) = 0.3$, $P(B) = 0.41$; therefore, $P(A \cup B) = 0.3 + 0.41 = 0.71$.

Problem 7: Explain whether the given events are disjoint or not.

(a) A : winning the lottery; B : the weather being cloudy

(b) A : flying to Vegas; B : driving to Vegas

(c) A : getting a 'two pair' in cards B : having three red cards in a card game

Problem 8: Explain whether the following statement is true or false: $P(A \cap B) = 0$ if A and B are disjoint.

Problem 9: Explain whether the following statement is true or false: if A and B are independent events, then $P(A \cap B) = 0$.

Problem 10: Do independent events always have to have some event in common? Explain.

Problem 11: Explain why $0! = 1$ by describing its 'English' interpretation.