Part 6.1: Complementary, Complementary, Independent and Mutually Exclusive Events Exercise

1. P(A) = 0.5, P(B) = 0.6 and P(A ∩ B) = 0.4
   a. Are A and B independent?
   b. Are A and B mutually exclusive?
   c. Find P(A U B)

2. Events C and D are mutually exclusive. P(C) = 0.35 and P(D) = 0.45
   a. Find P(C U D)
   b. Find P(C ∩ D)

3. Events E and F are independent. P(E) = 0.2 and P(F) = 0.3
   a. Find P(E ∩ F)
   b. Find P(E U F)

4. The table below shows the proportion of students that live more than 1km away from school, and the number of students who catch a bus.

	Catches the bus to school	Does not catch the bus to school
Lives more than 1km away from school	0.4	0.25
Lives more than 1km away from school	0.2	0.15

   Are the events "a student lives more than 1km away from school" and "a student catches a bus to school":
   a. Mutually exclusive?
   b. Independent?

5. Two movies come out in the same week and the local movie theatre is screening both of them. Of the 1420 people that go to the movies that week: Captain Africa: The First Nemesis is seen by 852 people, Awesome Man: Dawn of Fairness is seen by 710 people. 284 people do not see either of those movies. Are the events "Going to Captain Africa: The First Nemesis" and "Going to Awesome Man: Dawn of Fairness"
   a. Mutually exclusive?
   b. Independent?

6. Two servers are running at a school. The likelihood of the first (older one) failing in the next week is 0.01. The likelihood of the second (newer one) failing in the next week is 0.005. The likelihood of both servers failing in the next week is 0.001. Explain if these two events are independent or not.

Part 6.1 Answers

1a. No ($0.5 \times 0.6 \neq 0.4$)
1b. No ($0.4 \neq 0$)
1c. 0.7

2a. 0.8
2b. 0

3a. 0.06
3b. 0.44

4a. No
4b. No

5a. No
5b. Yes

6. No