Situation A:
A dog has a litter of 5 puppies, 4 females and 1 male. The dog's owner thinks this is unusual. If the probability that any puppy born will be a female is 12, what is the probability that a dog who has a litter of 5 puppies will have exactly 4 females? Is this case unusual? Explain.

Situation B:
To be on the safe side, three detectors were installed in a factory room to make sure that if there was a fire, at least one of them would signal a warning. The company that manufactured the smoke detectors indicated that, based on their testing, the probability that any one of the smoke detectors will work correctly is 0.75 (meaning that it works 75% of the time in the long run). This also means that there is a 25% chance that if there is smoke or a fire, the detector will not work! What is the probability that if there was smoke in the factory, none of the three detectors would work? Does this probability indicate a safety problem for the factory? Explain.

Situation C:
An automobile factory has a reputation for assembling high-quality cars. However, several new cars that had a problem with the brakes were shipped out to dealers. It is estimated that approximately 10% of the cars assembled at this factory have defective brakes. 5 of these cars are shipped to a dealership near your school. What is the probability that none of the 5 cars will have defective brakes? Should the dealership be concerned? Explain.

Situation D:
Your class is planning to collect data at a wildlife refuge center for the next 5 days. The staff at the refuge center indicated that there is a 40% chance of seeing an eagle during any one of the days of your visit. What is the probability that if your class visits the refuge for 5 days, you will see an eagle 2 or more days during your 5-day visit at the refuge center? Your teacher also indicated that if you see 2 or more eagles during the 5 days, your class will be able to name one of the eagles as part of a fundraiser. Do you think you have a good chance of being able to name an eagle? Explain.

Situation E:
At a small animal emergency hospital, there is a 1 in 6 (about 17%) chance that an animal brought into the hospital may need to stay overnight. The hospital only has enough room to accommodate 2 animals per night. On a particular day, 5 animals were brought into the hospital. What is the probability that at least 3 of the animals may need to stay overnight? If seeing 5 animals per day is typical for this hospital, do you think the hospital is usually able to accommodate all of the animals that might have to stay overnight? Explain.