

MATH 201
HOMEWORK 3
WRITTEN PROBLEMS

5. A system is composed of 5 components, each of which is either working or failed. Consider an experiment that consists of observing the status of each component, and let the outcome of the experiment be given by the vector $(x_1, x_2, x_3, x_4, x_5)$, where x_i is equal to 1 if component i is working and is equal to 0 if component i is failed.

- (a) How many outcomes are in the sample space of this experiment?
- (b) Suppose that the system will work if components 1 and 2 are both working, or if components 1, 3, and 5 are all working. Let W be the event that the system will work. Specify all the outcomes in W .
- (c) Let A be the event that components 4 and 5 are both failed. How many outcomes are contained in the event A ?
- (d) Write out all the outcomes in the event AW .

56. Two players play the following game: Player A chooses one of the three spinners pictured in Figure 2.6, and then player B chooses one of the remaining two spinners. Both players then spin their spinner, and the one that lands on the highest number is declared the winner. Assuming that each spinner is equally likely to land in any of its 3 regions, would you rather be player A or player B ? Explain your answer.

11. If $P(E) = .9$ and $P(F) = .8$, show that $P(EF) \geq .7$. In general, prove *Bonferonni's inequality*, namely,

$$P(EF) \geq P(E) + P(F) - 1$$

12. Show that the probability that exactly one of the events E or F occurs equals $P(E) + P(F) - 2P(EF)$.