

### Math 110 Review for Exam-2 Summer 2006

1. Three coins are tossed. Using ordered triples, give: (a) the sample space, (b) the event  $E$  that at least two are heads, (c) the probability that at least two are heads.
2. A family has 3 children. Using  $g$  to stand for girl and  $b$  for boy, and using ordered triples such as  $(b, g, g)$ , find (a) the sample space (list all elements), (b) the event  $E$  that the family has exactly two daughters, (c)  $p(E)$  and  $o(E)$ . (b) Find the probability that all children are of the same sex. (c) Is it more likely that all children are of the same sex or that both sexes are represented? Explain. (d) Find the probability that the family has three daughters, given that the family has at least two daughters.
3. Find the expected value for each \$1 bet in roulette.  
(a) single number bet, (b) red-number bet. (c) six-number bet.
4. If  $p(E) = \frac{5}{9}$ ,  $p(F') = \frac{3}{9}$  and  $p(E \cup F) = \frac{8}{9}$ ,  
(a) find  $p(F)$ , (b) find  $p(E \cap F)$ , (c) and find  $p(E|F)$ .
5. Find the expected value of a \$1 bet in the following game:  
A pair of dice is rolled. If the sum is greater than 10, the player wins \$11. Otherwise the player loses the bet. Would you play this game? Why or why not?
6. Find the expected value of a \$1 bet in the following game: You are being dealt one card from a deck of 54 cards (standard 52-card deck plus two jokers). If your card is a diamond you win \$3. Otherwise you lose the bet. Would you play this game? Why or why not?
7. Flashlights are being sold at the local salvage store at a very low price. Of the remaining 16 flashlights 7 have some defects. The defects are not visible to the eye. You decide to buy three of the flashlights. Find the probability of the following: (a) All three flashlights are broken. (b) All three flashlights are in working order. (c) At least one flashlight is in working order.
8. (a) Find the probability of winning first prize (six winning numbers) from a 6/46 lottery. (b) Find the probability of winning third prize (having exactly four of the six winning numbers) from a 6/46 lottery. (c) Find the probability of having not a single winning number from a 6/46 lottery. (d) Find the probability of having at least one winning number from a 6/46 lottery.
9. An insurance company estimates that 13% of insured drivers of a certain type of automobile report an accident in a given year. The average damage to the driver's car per accident is \$2350. Use the expected value to determine how much the insurance company should collect as premium for collision coverage?
10. A manufacturer produces 57% of its light bulbs in Hong Kong and the rest in Mexico. 2.1% of the light bulbs produced in Hong Kong are defective, and 1.7% of the Mexican light bulbs are defective. Find the following probabilities: (Hint: Tree.) (a) A light bulb is defective, given that it was produced in Hong Kong. (b) A light bulb is defective and was produced in Hong Kong. (c) A light bulb is not defective.
11. At the University of Southeastern North Dakota all education majors are required to pass a mathematical skills test in order to graduate. Students are allowed to take the exam up to three times. 65% of students pass the exam on the first try, 51% of students that take the second exam pass, and 40% of the students that take the third exam pass. All students attempt to pass the exam.  
(a) Use a tree diagram to find the percentage of education majors that fail to satisfy the graduation requirement.  
(b) What percentage of students pass the graduation requirement.

12. In a recent study 600 married men and women were asked whether they would marry their current spouse again. The outcome is given on the right.

Would you marry your current spouse again?

	Yes	No
Men	125	175
Women	95	205

Let  $A$  denote the event "would marry current spouse again" and  $B$  the event "being a woman". (a) Explain in words the meaning of the following probabilities:

(i)  $p(A)$                       (ii)  $p(A \cap B)$                       (iii)  $p(A|B)$ .

(b) Find the probabilities of part part (a).

(c) Find the probability that a men participating in the survey would marry his current spouse again.

**13.** Two cards are dealt from a full deck of 52 cards. Use a tree diagram to find the probabilities of the following events.

(a) The second card is a club, given that the first card was a club.

(b) The second card is a club, given that the first card was not a club.

(c) The second card is a club. (d) Both cards are clubs.

(e) The first card is not a club, given that the second card was a club.