

Unit 2 – Introduction to Probability
Week #3 - Practice Problems

~~**Due Monday September 29, 2008**~~
Revised Due Date: Monday October 6, 2008

1. **Before you begin:** *This exercise gives you practice with some of the basics of probability calculations. See lecture notes pp 9-12.*

Let A and B denote two independent genetic traits. Suppose the probability that an individual will exhibit trait A is $\frac{1}{2}$ and the probability that an individual will exhibit trait B is $\frac{3}{4}$. What is the probability that an individual will exhibit

- (a) Both traits?
- (b) Neither trait?
- (c) trait A but not trait B?
- (d) trait B but not trait A?
- (e) exactly one trait?

2. **Before you begin:** *This exercise gives you practice with the multiplication rule. For this, see lecture notes pp 25-26 and/or the text pp 57. Notice that this is about the general multiplication rule and not the special case where the events are independent.*

Suppose you are told that $\text{pr}(\text{right eye is blue}) = \frac{1}{3}$ and $\text{pr}(\text{left eye is blue}) = \frac{1}{3}$. Using the concepts and formulae in the lecture notes for Unit 2 (Introduction to Probability), confirm for yourself what you know by intuition, namely that $\text{pr}(\text{person is blue eyed}) = \frac{1}{3}$ by solving for $\text{pr}(\text{blue right eye and blue left eye})$.

3. **Before you begin:** *This exercise gives you practice with Bayes Rule. See lecture notes pp 29-30 and/or the text pp 57-63.*

A physician develops a diagnostic test that is positive for 95% of the patients who have disease and is positive for 10% of the patients who do not have disease. Of patients tested, 20% actually have disease. Suppose you evaluate a patient by administering this diagnostic test and obtain a positive result. Using the information given, calculate the probability that this patient has disease.