Tutorial 1: Answers
February 16-17, 2006

1. (a) $\frac{1}{5}$
   (b) $(\frac{4}{5})(\frac{1}{3}) = \frac{4}{15}$
   (c) $(\frac{2}{5})(\frac{1}{3}) + (\frac{3}{5})(\frac{2}{3}) = \frac{8}{15}$
   (d) $\frac{2}{5}$
   (e) $1 - \frac{3}{10} = \frac{7}{10}$

2. Our goal is to determine $P(M|R)$, which we may find by means of Bayes' Rule:

$$\begin{aligned} P(M|R) &= \frac{P(M \cap R)}{P(R)} \\ &= \frac{P(M)P(R|M)}{P(M)P(R|M) + P(M^c)P(R|M^c)} \\ &= \frac{(0.01)(0.88)}{(0.01)(0.88) + (0.99)(0.07)} \\ &\approx \boxed{0.1127} \end{aligned}$$

3. A_{12} and A_{13} are independent, and the same is true of any other pair from the events A_{12}, A_{13}, and A_{23}. However, A_{12}, A_{13}, and A_{23} are not independent. In particular, if A_{12} and A_{13} occur, then A_{23} also occurs.