Discrete Mathematics 21-228: Spring 2002
Homework.
HW4 due Wednesday 2/20/02

Q1 A box contains a red and b blue balls. A person reaches into the box and removes a random ball. If it is blue he/she replaces it and tries again. Show that the expected number of tries until a red ball is drawn is $\frac{a+b}{a}$.

Q2: A box contains a red and b blue balls. A person reaches into the box and removes a random ball. If it is blue he/she throws it away it and tries again. Let $f(a,b)$ denote the expected number of tries until a red ball is chosen. Show that

$$f(a,b) = 1 + \frac{b}{a+b} f(a,b-1).$$

Prove by induction on $a+b$ that

$$f(a,b) = \frac{a+b+1}{a+1}.$$

Q3: A bowl contains n cherries, exactly m of which have had their stones removed. A pig eats p random cherries without announcing how many contained stones. Subsequently, a cherry is picked randomly from the bowl.
(a) What is the probability that this cherry contains a stone.
(b) Given that this cherry contains a stone, what is the probability that the pig consumed at least one stone?