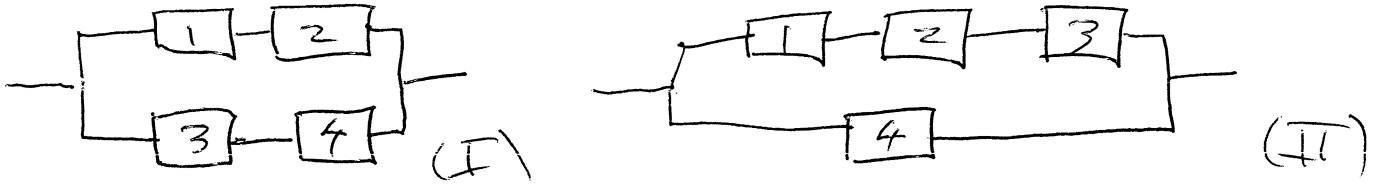
Math 461
HW 5
Due 10/2/08

1. If I wear a yellow shirt, a mosquito will bite me with probability .7. If I don't wear a yellow shirt, a mosquito will bite me with probability .2. I wear a yellow shirt with probability p, and observe that if I am bitten by a mosquito, the probability that I was wearing a yellow shirt was $\frac{2}{3}$. Determine p.

2. One can build compound parallel/series circuits.



I works if (1 & 2 both work) or (3 & 4 both work)

II works if (1 & 2 & 3 all work) or (4 works).

Assuming the components are <u>independent</u> and work with probability p each, determine $f_I(p)$, the probability that I works and $f_{II}(p)$, the probability that II works. By considering $f_I(p) - f_{II}(p)$ as a function of p, $0<p<1$, decide which one is the more reliable design.

3.a) Suppose X is a random variable which takes only two values: $p(X=17)=.1$, $p(X=-3)=.9$. Determine $E(x)$ and $Var(X)$.

b) Suppose $S = X_1 + \cdots + X_{400}$ is a sum of 400 <u>independent</u> random variables. Determine $E(S)$ and $Var(S)$. What does Chebyshev's Theorem give as an upper bound for $P(S \geq 0)$?