ECE 331, Lec. 1
Exam 1
Wednesday, 1 Mar. 2000

100 Points

Justify your answers! **Be precise!**

Closed Book **Closed Notes**

Some Formulas

- $\mathsf{var}(X) := \mathsf{E}[(X - \mathsf{E}[X])^2]$.
- If X is a nonnegative random variable with probability generating function $G_X(z)$, then $\mathsf{E}[X] = G'_X(z)|_{z=1}$ and $\mathsf{E}[X(X-1)] = G''_X(z)|_{z=1}$.
- The binomial theorem says that

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}, \quad \text{where } \binom{n}{k} := \frac{n!}{k!\,(n-k)!}.$$

- The geometric series:

$$\sum_{k=0}^{N-1} z^k = \frac{1-z^N}{1-z}, \quad z \neq 1.$$

If $|z| < 1$,

$$\sum_{k=0}^{\infty} z^k = \frac{1}{1-z}, \quad \text{for } |z| < 1.$$