ELEC 697: Homework Oct. 6, 1998

1. Proof that $E[E[X|Y]] = E[X]$.

   - You may use the density formula with $f(x|y)$. However, there is a simple argument which works in all generality: Note that $E[Z] = \int_\Omega Z dP$ for every r.v. Z and use property ii) of conditional expectations.

2. Use 1) to calculate $E[X_1 + ... + X_N]$ where X_i are i.i.d. and N is a r.v. independent of all X_i.

   - Hint: Show that $E[X_1 + ... + X_N|N] = E[X_1] + ... + E[X_N]$.

3. Setting as in 2). Assume in addition that N is Poisson(λ) and calculate $E[X_1 \cdot ... \cdot X_N]$.

For hints email riedi@rice.edu .