I. let the prior for p be the beta with parameters $(r', n') = (3, 5)$. let r be the number of successes in a binomial sample of size $n = 4$. Let $f'(p)$, $f''(p|r)$ be the prior and posterior density functions for p and $f(r)$ be the marginal probability mass function for r.

Part A: A1. Write down the $f'(p)$, $f''(p|r)$.

A2. Write down the mean and variance of $f'(p)$, $f''(p|r)$.

A3. write possible values for r and $f(r)$, in the following table.

r	1	2	3	4	Total
$f(r)$					

Problem I continued

Part B: Assume the opportunity loss function is given by

$$l_t(a, p) = 10^8(a - p)^2$$

B1. Find a° and EVPI.

B2. Find a_r° and $\bar{l}_t''(a_r^\circ, r)$ by completing following table [r and $f(r)$ are as in Part A].

r	1	2	3	4	Total
$f(r)$					
a_r°					
$\bar{l}_t''(a_r^\circ, r)$					

B3. Find the $E_r[\bar{l}_t''(a_r^\circ, r)]$.

B4. Find EVSI.

Problem I continued

Part C: Assume the opportunity loss function is given by

$$l_t(a,p) = \begin{cases} 600(p-a), & a \le p, \\ 400(a-p), & a \ge p. \end{cases}$$

B1. Find a° and EVPI.

B2. Find a_r° and $\bar{l}_t''(a_r^\circ, r)$ by completing following table [r and $f(r)$ are as in Part A].

r	1	2	3	4	Total
$f(r)$					
a_r°					
$\bar{l}_t''(a_r^\circ, r)$					

B3. Find the $E_r[\bar{l}_t''(a_r^\circ, r)]$.

B4. Find EVSI.

II. Let the state space $S = [0, 1]$ with the prior distribution $f'(s) = 2s,\ 0 \leq s \leq 1$. Assume the sample distribution $f(z|s)$ for a given s is a uniform distribution on $(0, s)$. In the two-Action Problem with

$$v_t(a_1, s) = 3000s, \qquad v_t(a_2, s) = -6000 + 13000s$$

A. Find the posterior distribution $f''(s|z)$ and the marginal sample distribution $f(z)$.

B. Find a° and EVPI

Problem II continued

C. Find a_z° and $\bar{l}_t''(a_z^\circ, z)$

D. Find the $E_r[\bar{l}_t''(a_z^\circ, r)]$.

E. Find EVSI and the expected net gain of sampling for the cost function $c(z) = 5000z$.