The following two[1] questions are drawn from my own readings of (and puzzlings over) the Salmon & Earman Chapter "The Confirmation of Scientific Hypotheses" (in the course reader). As in my lectures, these questions focus on sections 2.1–2.4, 2.9, and 2.10. I urge you to read the entire chapter, and to think about the questions at the end of the chapter, including those which pertain to the other sections of the chapter. These questions of mine are meant mainly to *supplement* theirs.

1. Unlike Skyrms, Salmon & Earman (section 2.7) take the *conditional* probability $\Pr(p \mid q)$ as *primitive*, and they *define* the unconditional probability $\Pr(p)$ as $\Pr(p \mid \top)$, where $\top$ is any logical truth (*viz.*, $\ulcorner r \vee {\sim} r \urcorner$). This avoids the problem — faced by Skyrms' treatment of probability — of cases in which q [in $\Pr(p \mid q)$] has (unconditional) probability zero, leading to a zero denominator. However, the formal account of Salmon & Earman faces an even more serious problem: *it is logically inconsistent!* Show that the Axioms 1–4 of Salmon & Earman (on pages 67-68) are logically incoherent. Discuss how they can fix their axiomatization, so as to render it logically consistent. Comment on how this "fix" relates back (directly!) to the problematic (zero denominator) case faced by Skyrms' account.

2. The following conditions (most of which are discussed by Salmon & Earman) have all figured prominently in the historical literature on confirmation:

   C1 (non-triviality) For all H, there is an E which does not confirm H.
   C2 (entailment) H is confirmed by E, if $E \vDash H$.
   C3 (converse entailment) H is confirmed by E, if $H \vDash E$.
   C4 (converse consequence) If E confirms H and $H' \vDash H$, then E confirms H'.
   C5 (special consequence) If E confirms H, and $H \vDash H'$, then E confirms H'.

   Though individually appealing, no confirmation concept can satisfy all of these conditions. The object of this exercise is to show, however, that the Bayesian (positive relevance) concept comes close, in that it satisfies C1–C3, together with slightly weaker versions of C4 and C5.

   (a) Show that C1, C4, and C5 are jointly inconsistent.
   (b) Show that C1, C3, and C5 are jointly inconsistent.
   (c) Show that C1, C2, and C4 are jointly inconsistent.
   (d) Show that weak Bayesian confirmation [which is defined as follows: E weakly Bayesian confirms H if and only if $\Pr(H \mid E) \geq \Pr(H)$] satisfies conditions C1–C3.
   (e) Let us stipulate that E is an *explanatory consequence* of H iff $\Pr(E \mid H) \cdot \Pr(H)$ is large relative to $\Pr(E \mid {\sim}H) \cdot \Pr({\sim}H)$, so that H accounts for " a large share" of E's probability. Now, consider the following weakened versions of C4 and C5:

      C4* If E is an explanatory consequence of H, and $H' \vDash H$, then E confirms H'.
      C5* If E and H' are explanatory consequences of H, then E confirms H'.

      Show that, considered as rules-of-thumb (since explanatoriness and and confirmation both admit of degrees) both C4* and C5* are satisfied by Bayesian confirmation. (Do you see how the inconsistencies in parts (a)–(c) above are blocked when C4 and C5 give way to C4* and C5*?)
   (f) Give an example in which (*i*) E and H' are (both) *non*-explanatory consequences of H, and (*ii*) E *dis*confirms H'. [**Hint**: you want both E and H' to be highly probable given ${\sim}H$ *and* given H. That is, you want $\Pr(E \mid H)$, $\Pr(E \mid {\sim}H)$, $\Pr(H' \mid H)$, and $\Pr(H' \mid {\sim}H)$ *all* to be *high*.]

[1] Question 2 can probably be broken into *multiple* short paper topics. If interested, please discuss this prospect with me.