(2) When you put cream in your coffee, which causes the larger increase in entropy, the mixing of cream and water or the heat exchange between cream and water?

Let M be the mass of the coffee, m and c_v the mass and heat capacity of the cream. I shall adopt a temperature of 273 + 57, or 330° K for the coffee, and 273 + 17, or 290° K for the initial temperature of the cream. To the first order in m/M the entropy increase resulting from the heat exchange, ΔS_{heat}, is $m\ c_v\ (330 - 290)(1/310 - 1/330)$, which is 0.008 $m\ c_v$. For the mixing entropy increase, ΔS_{mix}, we must disregard the water in cream. (Remember the Gibbs paradox!) Assume a fraction f of the cream is not water, but is something else—presumably butterfat—with molecular weight W_{cr}. These molecules, fm/W_{cr} of a mole, are now distributed through a volume M/m times larger, so the mixing entropy change is $(fm/W_{cr})\ R \ln(M/m)$. With $R = 2$ cal/mole deg, and $c = 1$ cal/gm deg, I'll assume $f = 1/3$ *and* $M/m = 10$. The ratio $\Delta S_{mix}/\Delta S_{heat}$ is then $200/W_{cr}$. The molecular weight of a "cream" molecule is surely greater than 200. A chemist friend thought 800 might be reasonable. So it appears that the heat exchange causes the larger increase in entropy–but not by a large factor.