Force, work and heat in rubber elasticity:

1. A double stranded DNA molecule was stretch 5 um by a force of 2 pN, using optical tweezers at a temperature of 300 K. Double stranded DNA has a $b_k = 100$ nm and each nucleotide measures .35 nm.

a) How long is this sequence?

b) How much work was required to pull this molecule?

c) If this process is reversible how much heat was transferred to or from the DNA?

d) If the process is isothermal, what is the entropy change?