Secret Code 20

7.10A) $\boxed{P_H = (1+K)^4}$ for a homotetramer (or $\frac{\prod_{i=1}^{4}(1+K_i)}{(1+K_1)(1+K_2)(1+K_3)(1+K_4)}$ for a heterotetramer)

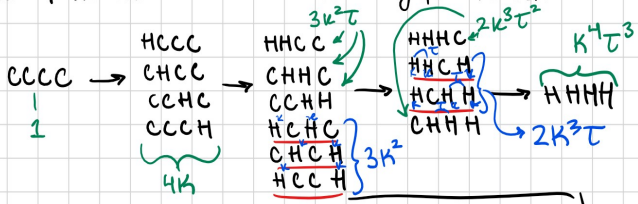
7.10B) $P_H = 1 + K\left[\frac{(K\tau)^5 - 4(K\tau) - (K\tau) + 4}{(K\tau - 1)^2}\right]$ for one helix zipper model for homopolymer (doesn't accomodate heteropolymers.)

$= 1 + K^4\tau^3 + 2K^3\tau^2 + 3K^2\tau + 4K$ (simplify w/ sympy)

$= \boxed{1 + 4K + 3K^2\tau + 2K^3\tau^2 + K^4\tau^3}$

$(1+K)^4 = 1 + 5K$

7.10C) All partly helical states that have gaps are left out. "islands"



$\boxed{2K^3\tau + 3K^2}$ left out

Theoretical: $1 + 4K + 3K^2\tau + 3K^2 + 2K^3\tau^2 + 2K^3\tau + K^4\tau^3$

Zipper: $1 + 4K + 3K^2\tau + 2K^3\tau^2 + K^4\tau^3$

7.10D) $P_H = (1+1)^4 = 2^4 = \boxed{16}$

7.10E) See jupyter notebook: $\boxed{2.172}$

7.10F) $2K^3\tau + 3K^2 = \boxed{5.2 \times 10^{-5}}$

As found in 10.C

where $K = .00164$, $\tau = 5 \times 10^3$ (See jupyter)

Very small b/c τ large

7.10G)

$P_{NC} = \binom{N}{j}\frac{K^j}{(1+K)^N} = \binom{4}{j}\frac{K^j}{(1+K)^4}$

	c4	c3h	c2h2	ch3	h4
Noncooperative K=1	$\binom{4}{4}\frac{1^4}{(2)^4} = \frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{16}$
Zipper	0.46604	0.00302	0.0185	0.1016	0.4164

7.10I) $\langle f_H \rangle_{noncoop} = 0.5$

$\langle f_H \rangle_{zipper} = 0.2010$

See jupyter!