

Modeling the Living Cell HW 7

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Problem 1

1. There are 9 species to keep track of
 - (a) geneA
 - (b) mRNA A
 - (c) geneA bound
 - (d) A
 - (e) geneR
 - (f) geneR bound
 - (g) mRNA R
 - (h) R
 - (i) C
2. There are 16 reactions in total, 14 reactions plus the 2 reversible reactions.
3. Reactions 10, 11, 12, 13, and 14 involve the degradation of a species.
4. 9, 2a (the forward reaction) and 5a both involve bimolecular association. Of these the formation of the C complex occurs the fastest.
5. geneA exists both on its own and in its bound complex, the bound complex forms when A binds to geneA, so the formation of A (which occurs only from the bound complex), is a positive feedback loop, where excess A promotes its own formation.
6. geneR is transcribed to mRNA more frequently.
7. mRNA R is translated into protein more frequently.
8. R degrades the most frequently.