Problem 7.1 (a) Flux directly proportional to amount of enzyme. (b) Assuming independent throughput from A and B, increasing amount of A by 10% and keeping amount of B constant increases flux by 5%.

Problem 7.2 (a) $k_{off} = K_D \cdot k_{on}$ (b) half-life = $\ln 2/k_{off}$ (c) half-life = $\ln 2/k_{off} = \ln 2/(K_D \cdot k_{on})$

Problem 7.3

Aspartate	$OOC\text{-}CH(NH_3^+)\text{-}COO^-$
aspartate-4-phosphate	$OOC\text{-}CH(NH_3^+)\text{-}COOPO_3^-$
aspartate semialdehyde	$OOC\text{-}CH(NH_3^+)\text{-}CHO$
Homoserine	$OOC\text{-}CH(NH_3^+)\text{-}CH_2CH_2OH$
O-succinylhomoserine	$OOC\text{-}CH(NH_3^+)\text{-}CH_2CH_2CO(=O)CH_2CH_2COO^-$
Cystathione	$OOC\text{-}CH(NH_3^+)\text{-}CH_2CH_2SCH_2C(NH_3^+)COO^-$
Methionine	$OOC\text{-}CH(NH_3^+)\text{-}CH_2CH_2SCH_3$

Problem 7.4 The goal is to get from 555555 to 660666. Note that if you could get to 663366 the solution is one step away. Therefore the problem breaks into two symmetrical problems of getting from 555 to 663. Because you cannot form 8-carbon molecules, the first step must be 555 to 375 (or 357 or 537 or 573 or 735 or 753). The simplest path involves as the next step 375 to 645 (or permutations). By exploring possibilities, you should be able to get from 555 to 663 in three steps.

Problem 7.5 For example, choose either Asp or Glu, and assign doublet 'codon' ga to your choice.

Problem 7.6 (a) Ask yourself: Will the structure of the CAP + RNA polymerase complex with the operator be able to form at the right position? (b) A gene upstream of the polymerase binding site will not be transcribed. Without LacZ no allolactose will be produced. How will this affect repressor binding? (c) Glucose will normally reduce CAP binding. But the mechanism by which it does so is to reduce cyclic AMP levels. Artificial restoration of high cyclic AMP levels should short-circuit this mechanism. (d) As in part (b), without LacZ no allolactose will be produced. How will this affect repressor binding? Addition of isopropylthiogalactoside should override the lack of allolactose.

Problem 7.7 Use fork with three tines.

Problem 7.8 N questions with Yes-or-No answers can select a particular element from a set of 2 objects. For what value of N is $2^N \geq 26$?