Chapter 2: Matrices

1. Inverses
   \[ A^{-1} = \frac{1}{ad-bc} \]

2. Input-output analysis
   \[ X = (I-A)^{-1}D \]

Chapter 3: Linear programming

1. Graphing the feasible set: drawing lines and shading the right half space
2. Finding the corner/vertex where the objective function is maximized/minimized

Chapter 5: Counting Problems

1. Inclusion-exclusion principle
   \[ n(A \cup B) = n(A) + n(B) - n(A \cap B) \]
2. De'Morgan's law
   \[ (A \cup B)' = A' \cap B' \]
   \[ (A \cap B)' = A' \cup B' \]
3. Multiplication principle
   1. and = multiply
   2. or = add
4. Permutations and combinations
   1. \( P(n,r) = \frac{n!}{(n-r)!} \)
   2. \( C(n,r) = \frac{n!}{r!(n-r)!} \)
5. Ordered Partitions = \( n! / (n1! n2! n3!...nm!) \)

Chapter 6: Probabilities using counting

1. Experiments, outcomes, sample spaces, events
   1. Sample space = set of all possible outcomes
   2. Event = any subset of the sample space
2. Odd in favor/against
   1. Odds = \( Pr / (1-Pr) \)
   2. \( Pr = \text{odds} / (\text{odds} + 1) \)
3. Calculating probabilities of events
   1. \( Pr(E|F) = Pr(E \cap F) / Pr(F) \)
4. Conditional probability = Baye's Theorem
   1. \( Pr(E|F) = Pr(E \cap F) / Pr(F) \)
5. Independent events, if:
   1. \( Pr(E \cap F) = Pr(E)Pr(F) \)

Chapter 7: Probability & Statistics

1. Normal distribution and Z-scores
   \[ z = \frac{x-\mu}{\sigma} \]
2. Exact values:
   1. \( Pr(x \geq a) = 1 - Pr(x < a) = 1 - Pr(z \leq [(a-\mu)/\sigma]) = 1 - A(a) \)
   2. \( Pr(a \leq x \leq b) = Pr(z \leq b) - Pr(z \leq a) = A(b) - A(a) \)
3. Estimations:
   1. \( Pr(x = a) = Pr(a-0.5 \leq x < a+0.5) = Pr([(a-0.5-\mu)/\sigma] \leq z \leq [(a+0.5-\mu)/\sigma]) = A(z_a) - A(z_b) \)
2. Binomial trials
   1. \( C(n,r)(p)^r(q)^{n-r} \)
3. Approximation of binomial trials by normal distribution
   1. Chebychev's Inequality:
      \[ Pr(\mu-c \leq x \leq \mu+c) \geq 1 - (sigma^2/c^2) \]
4. Mean & Standard deviation
   1. Expected value = \( E(x) = \mu = np \)
   2. \( SD = \sigma = \sqrt{npq} = \sqrt{[E(x-\mu)^2f]/(n-1)} \)

Chapter 8: Markov processes

1. Transition matrix
   1. \( S_n = A^n S_0 \)
2. Absorbing stochastic matrix
   \[ \begin{bmatrix} 1 & S \\ 0 & R \end{bmatrix} \]
3. Fundamental matrix
   1. \( (I-R)^{-1} \)
4. Stable matrix
   \[ \begin{bmatrix} I & S(I-R)^{(-1)} \\ 0 & 0 \end{bmatrix} \]

Chapter 9: Game theory

1. Strictly determined games/saddle points/optimal pure strategies
   1. Saddle point = max of row minimums & min of column maximums
2. Expected value
   1. \( E = RAC \)
3. Optimal mixed strategies
   1. \( r_1 = (d-c)/(a+d-b-c) \quad r_2 = 1 - r_1 \)
   2. \( c_1 = (d-b)/(a+d-b-c) \quad c_2 = 1 - c_1 \)
   3. \( E = (ad-bc)/(a+d-b-c) \)