DO ALL ASSIGNED PROBLEMS

Things to particularly study

1) Critical Thinking
   Basic strategies
   Be able to solve using the basic strategies, such as finding patterns, questioning, thinking critically, working backwards, estimating, making picture, drawing table, use variables, make a list, guess and test, solver simpler problem
   State 10 problem-solving strategies
   Estimation and rounding
   State and use Polya’s 4 problem-solving steps
   Understand, Devise plan, Carry out plan, Look back
   Know and use Fibonacci sequence
   Conditional (if…then), antecedent, consequent (premise, conclusion)
   Forms of Conditional and truth of each
   Converse, Inverse, Contrapositive

2) Sets
   Roster and Set-Builder notation, what is a set
   Finite, Infinite, Well-Defined, equal, equivalent, Empty (null)
   Elements, Subsets, proper subsets, notation, complement
   Two sets are subsets of each other, or A⊂B and B⊂C: meaning
   Universal set
   # subsets in a set, find all subsets of a set
   Cardinality n(A)
   Venn diagrams
   Intersection (“and”), Union (“or”), disjoint
   Understand and use DeMorgan’s Laws
   Cardinality of two overlapping sets
   \[ n(A \cup B) = n(A) + n(B) - n(A \cap B) \]
   Applications
3) Logic

Inductive/Deductive Reasoning
Know difference and definition

What is a statement?
Simple, Compound (Complex) Statements, notation,

Paradox
Conjunction, Disjunction, Negation
Inclusive, Exclusive OR
Conditional (if…then), Biconditional (iff)

Dominance of connectives
(Biconditional, conditional, con/disjunction, negation)
Best to use parentheses (over-rules all)

Equivalence, Tautology

Truth tables
Basics (negation, con/disjunction)
More complicated tables using “building blocks”
Prove or disprove “laws” or ideas
Simple truth tables with biconditionals,

conditionals

Forms of Conditional and truth of each (as in Chapter 1)
Converse, Inverse, Contrapositive

Translate English into symbols and vice-versa

Valid arguments
Premises, Conclusion
Valid (laws)

\[(P \rightarrow Q) \land P \rightarrow Q\]
\[(P \rightarrow Q) \land \neg Q \rightarrow \neg P\]
\[(P \rightarrow Q) \land (Q \rightarrow R) \rightarrow (P \rightarrow R)\]
\[(P \lor Q) \land \neg P \rightarrow Q\]

True Syllogisms
Universal Affirmative/Negative
Particular Affirmative/Negative

Invalid Arguments (Fallacies) – common ones

\[(P \rightarrow Q) \land Q \rightarrow P\]
\[(P \rightarrow Q) \land \neg P \rightarrow \neg Q\]

4) Application problems on all above

5) Be able to draw charts, write short essays, etc.
DO ALL ASSIGNED PROBLEMS

Things to particularly study

A. Statistics

1) Measures of Central Tendency
   Mean, median, mode, midrange
2) Quartiles, percentiles, deciles
3) Frequency tables, stem-and-leaf plots
4) Bar graphs, histograms, line graphs, pie charts
5) Use and misuse of statistics

B. Counting Principles

1) Meaning of n!
2) Fundamental counting Principle
3) Permutations (order counts) $nP_r$
4) # words from Mississippi
5) Combinations (order doesn’t count) $nC_r$

C. Probability

1) Basic terms: experiment, outcome, event, sample space
2) Dice, cards, coins
3) Theoretical vs Empirical Probability
   Relative Frequency (Empirical)
4) P(A) if all outcomes equally likely
   # (successful outcomes) / # (possible outcomes)
5) Impossible event, certain event
6) $0 \leq P(A) \leq 1$, $\sum p_i = 1$, $P(A) + P(A') = 1$
7) With, without replacement
8) Probability of “r” heads from “n” tosses
   Card hands, dice, marbles, keno-type
9) Probability using Permutations, Combinations
   Probability of a full house, etc
10) Ensure “randomness” in Probability
11) Find probabilities
   Use Venn Diagrams and tree diagrams
   Use other Theory
   \[ P(A \cap B) = P(A) \times P(B|A) \]
   If mutually exclusive: \( P(A \cap B) = 0 \)
   \[ P(A \cup B) = P(A) + P(B) - P(A \cap B) \]
12) Odds in favor of/against A
13) Mathematical Expectation
    \[ \sum \text{(winnings times probability)} \]
14) Expected Value

D. Geometry

1) Perimeters: square, rectangle, triangle, parallelogram, circle, any figure
2) Areas: square, rectangle, triangle, parallelogram, circle, combined objects
3) Volumes and surface area: box, right solid
4) Perimeters, areas and volumes, use given formulas
5) Pythagorean Theorem
6) Similar Triangles

E. For all above

1) Application problems
2) Be able to draw charts, write short essays, etc.
Things to particularly study

LOGARITHMS

1) Exponential functions and Logarithms: graph
2) Definition of Logarithms
3) Change between Exp and Log forms and use to solve problems
4) Evaluate Logs and solve $\log_b X = Q$ for $X$ without calculators
5) Calculators for $y^x$ and logs
6) Formula for change of base of logarithm
   $$\log_a (x) = \left\{ \frac{\log_b (x)}{\log_b (a)} \right\}$$
7) Calculator to find log base 3, etc.

FINANCE PERCENTS (Math 93/97 material)

8) Sales Taxes: find tax, rate, total – given other two
9) Commissions: find commission, rate, sales
10) Discounts
11) % increase/decrease

FINANCE

12) Simple Interest
13) Compound Interest
   i. Future Amount
   ii. Present Value
   iii. Time required, using logs
   iv. Interest rate
14) Compounding more than once per year
15) Effective interest
16) Annuities
17) Mortgages: amortization schedule
18) Rule of 72
19) Credit cards*, budgets*
20) IRA*, Roth IRA *
21) Diversification of funds *
22) Spending money (section 6.4) as time permits

ALL MATERIAL

23) Application problems on all above
24) Be able to draw charts, write short essays, etc.

* Mostly understanding: not many formulas

\[
\begin{align*}
F/P &= (1 + r)^t \\
P/F &= 1/(1 + r)^t \\
F/A &= (1 + r)^t - 1)/r \\
A/F &= r/(1 + r)^t - 1) \\
P/A &= (1 + r)^t - 1)/r \\
A/P &= r*(1 + r)^t /((1 + r)^t - 1) \\
r_{eff} &= (1 + r_{nom}/n)^n - 1 \\
F &= P * (1 + r_{nom}/n)^nt \\
F &= P * (1 + r)^t \\
P &= F / (1 + r)^t \\
t &= \log_{1+r} (F/P) \\
r &= (F/P)^{1/t} - 1
\end{align*}
\]