

MATH 120

Test 1

Spring, 2012

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 $A \subset B$ and $B \subset A$: 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)
 - $(P \rightarrow Q) \wedge P \rightarrow Q$
 - $(P \rightarrow Q) \wedge \sim Q \rightarrow \sim P$
 - $(P \rightarrow Q) \wedge (Q \rightarrow R) \rightarrow (P \rightarrow R)$
 - $(P \vee Q) \wedge \sim P \rightarrow Q$
 - True Syllogisms
 - Universal Affirmative/Negative
 - Particular Affirmative/Negative
 - Invalid Arguments (Fallacies) – common ones
 - $(P \rightarrow Q) \wedge Q \rightarrow P$
 - $(P \rightarrow Q) \wedge \sim P \rightarrow \sim Q$
 - 4) Application problems on all above
 - 5) Be able to draw charts, write short essays, etc.

MATH 120

Test 2

Spring, 2012

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) ${}_n P_r$
- 4) # words from Mississippi
- 5) Combinations (order doesn't count) ${}_n C_r$

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
 $\#(\text{successful outcomes}) / \#(\text{possible outcomes})$
- 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
 - $P(A \cap B) = P(A) * P(B|A)$
 - 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 (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
$$\mathbf{\log_a (x) = \{ \log_b (x) / \log_b (a) \}}$$
- 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

$$F/P = (1 + r)^t$$

$$P/F = 1/(1 + r)^t$$

$$F/A = \{(1 + r)^t - 1\}/r$$

$$A/F = r/\{(1 + r)^t - 1\}$$

$$P/A = \{(1 + r)^t - 1\}/\{r*(1 + r)^t\}$$

$$A/P = \{r*(1 + r)^t\}/\{(1 + r)^t - 1\}$$

$$r_{\text{eff}} = \{1 + r_{\text{nom}}/n\}^n - 1$$

$$F = P * (1 + r_{\text{nom}}/n)^{nt}$$

$$F = P * (1 + r)^t$$

$$P = F / (1 + r)^t$$

$$t = \log_{1+r} (F/P)$$

$$r = (F/P)^{1/t} - 1$$