

Math 1116
Dr. John Maharry
Spring 2013
Practice Final Exam
Final Exam is Monday April 29, 10:00-11:45

Name _____

These problems are typical of the type of problem that will be on the final exam. However, that does not mean that only these topics will be on the exam. I would also suggest looking over all of the midterms, homeworks and quizzes to make sure that you understand those ideas. It might be helpful to make a list of all of the “methods”, “Criteria”, “Formulas”.

1. Suppose I bought a sweater and after 7% tax is cost \$40.12. What was the original price?
2. If a TV was worth \$475 and a store sold it for \$550, what was their percent profit?
3. How much money would you have in an account after 10 years if you invested \$2000 at 6% annual interest? How much would you have if it was compounded monthly?
4. Suppose the population of a small town increases by 8%, 12% and 6% each year during the last three years. By what percent did it increase over the three year period? Second, what was the average yearly percent increase over the period?

5. Suppose the value of an investment was decreasing by 12% per year for 5 years. Then it started increasing at 4% for 3 more years.
 - a. If the account started at \$20,000. What is the value of the account at the end of the 8 year period?
 - b. Suppose a different account had a value of \$100,000 at the end of the 8 year period, what was the value at the beginning of the 8-year period?
6. Suppose I buy a microwave from the factory for \$85. How much should I mark-up the price, in order to still make a profit of 20% during the "30% Off Spring Clearance Sale"?

7. Randomly pick 2 cards from a deck. What is the probability that they are different suits?

8. Randomly choose 3 cards from a standard deck. What is the probability that you have no pairs (and therefore no three-of-a-kind either)?

9. You flip a coin 10 times. What is the probability that you get all heads?
Second, what is the probability that you will get exactly 5 heads?

10. Evaluate ${}_{82}C_2$ ${}_{96}P_2$ ${}_{100}C_{99}$

11. Find the odds in favor of getting a total of 11 when rolling two fair dice.

12. Suppose you flip a coin 5 times.

a. Find N (the number of outcomes in the sample space)

b. Find the Probability that the first three flips are all heads.

c. Find the probability that exactly three of the flips are heads.

13. Now consider a deck of cards. You are dealt three random cards. What is the probability that:

a. They are all Aces.

b. They are all the same suit.

c. They are all different suits

14. An airport limo must take 6 passengers to different downtown hotels from the airport before returning to the airport. Is this an example where an Euler circuit, an Euler path, a spanning tree, a Hamilton circuit or a Hamilton path would be of most use?

15. Circle all of the algorithms that would be appropriate above:
 Fleury's, Kruskal's, Cheapest Link, Repetitive Nearest neighbor, Brute force.

16. Using the mileage chart below find the Hamilton circuit given by using the nearest-neighbor method beginning with L. Give the total mileage for your trip.

| | B | D | H | L | N | P |
|---|------|------|------|-----|------|------|
| B | | 1748 | 1804 | 941 | 1088 | 561 |
| D | 1748 | | 243 | 819 | 660 | 1204 |
| H | 1804 | 243 | | 928 | 768 | 1313 |
| L | 941 | 819 | 928 | | 168 | 388 |
| N | 1088 | 660 | 769 | 168 | | 553 |
| P | 561 | 1204 | 1313 | 388 | 553 | |

17. How would repetitive nearest neighbor be different? You don't have to actually do it.

18. Is repetitive nearest neighbor an efficient algorithm? Is it optimal?

19. Find a Hamilton circuit for the mileage chart above using the cheapest-link algorithm.

| | B | D | H | L | N | P |
|---|------|------|------|-----|------|------|
| B | | 1748 | 1804 | 941 | 1088 | 561 |
| D | 1748 | | 243 | 819 | 660 | 1204 |
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| P | 561 | 1204 | 1313 | 388 | 553 | |

6. The population of state A is 1407 thousand, of state B is 6804 thousand, of state C is 1101 thousand, of state D is 1998 thousand, of state E is 2295 thousand and of state F is 1695 thousand. Find the apportionment of 51 seats using Hamilton's Method.

7. For the same states as in question 6, with the same populations and with 51 seats, use modified divisors of 320 and 325 and determine the apportionment for either Adam's method or Webster's method. (One of them will work out nicely with one of the divisors given above).

11. Determine the value of $1+2+3+4+5 + \dots + 2218 + 2219 + 2220$. Think about the formula for the number of edges in a graph with 2220 nodes.

12. In an election with 7 candidates and 150 voters, how many total points are there in a Borda count election?

13. Consider the following set of Ballots.

| | 12 | 8 | 7 | 5 | 4 |
|------------------------|----|---|---|---|---|
| 1 st Choice | A | B | C | D | E |
| 2 nd Choice | B | C | B | C | D |
| 3 rd Choice | E | A | E | A | C |
| 4 th Choice | D | D | D | E | A |
| 5 th Choice | C | E | A | B | B |

Answer the following: (Show your work)

a. Find the points A would earn in the Borda count Method?

b. Which candidate is the winner by the Plurality by Elimination Method?

c. Suppose B had dropped out of the race before the votes were cast. Who would win the election by the Plurality with Elimination Method?

- d. This example shows that Plurality with Elimination violates which criterion?