

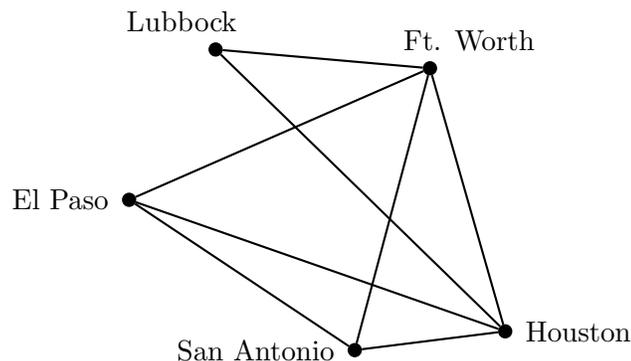
Final Exam
Math 1300
Fall 2011

Instructions: Solve 14 of the problems 1–16. If you solve more than 14 problems, you must clearly mark which 14 you want to be graded. For full credit, you must show complete, correct, legible work. Read carefully before you start working. No books or notes are allowed. Calculators are allowed, phones and PDAs are not.

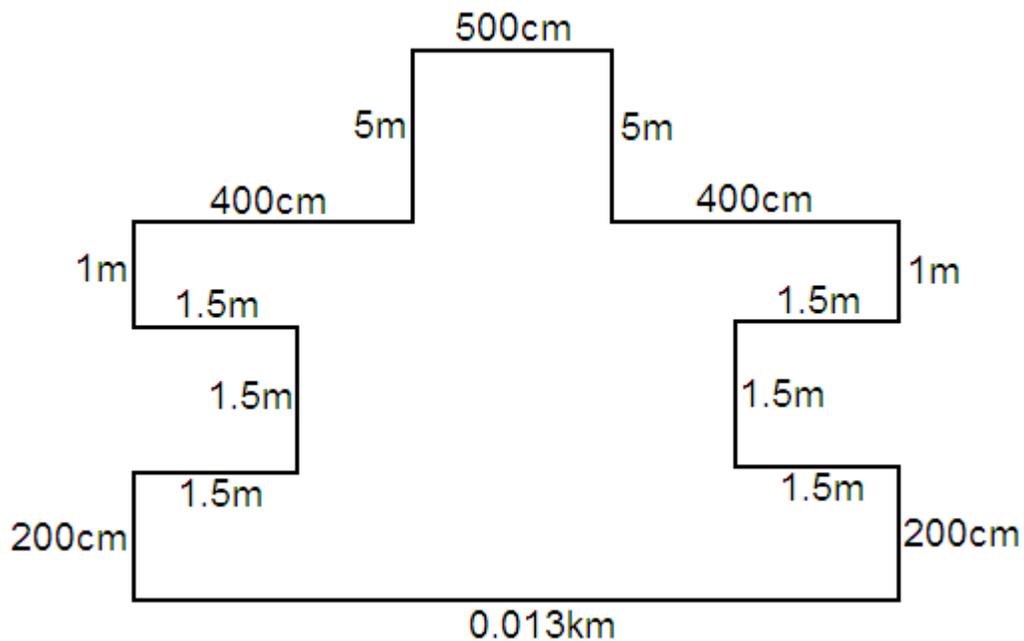
- Write the first seven rows of Pascal's triangle and use it to answer the following questions.
 - In an experiment, a coin is tossed 5 times. The outcome is 2 tails and 3 heads. In how many ways can this come about?
 - A couple has 6 children, 3 boys and 3 girls, in how many different ways can this happen?
- Solve each of the following equations for x (make sure to show *all* your work).
 - $\ln\left(\frac{x}{3}\right) + 2\ln(x) - \ln\left(\frac{1}{3}\right) - \ln(2) = \ln(1) - 2\ln\left(\frac{1}{x}\right)$
 - $e^{2x-1} = 4$
 - $e^{10} \cdot e^{-5} \cdot e^{2x-2} = e^5$
- A political candidate decides to travel to the cities Houston, Ft. Worth, San Antonio, El Paso, and Lubbock by air. The table below shows the relevant airfares in \$.

	Ft. Worth	Houston	Lubbock	San Antonio
El Paso	402	274		289
Ft. Worth		202	179	189
Houston			238	139

- Label the edges in the network below with the airfares from the table.
- Use the sorted edges method to plan a cheap that starts in Lubbock and visits all five cities.
- What is the cost of the trip you planned?

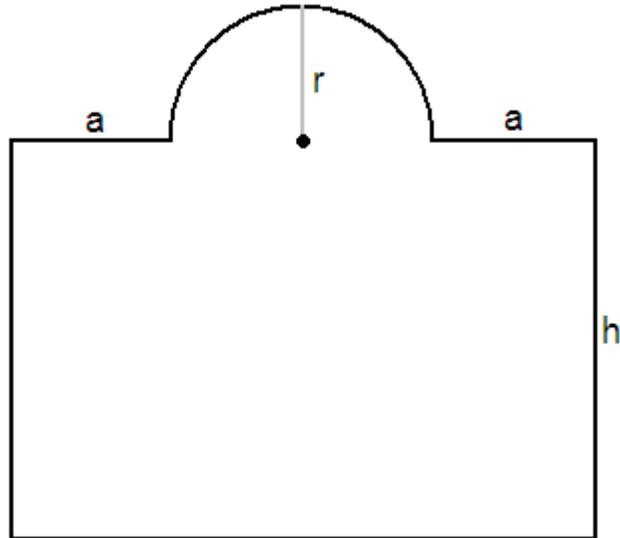


4. A charitable donation of nine used video projectors are to be distributed among six Sudanese schools. The projectors will be apportioned between the schools according to the number of students at each school; they have 144, 372, 580, 265, 153, and 286 students.
- Find the total number of students and the standard divisor.
 - Do the apportioning according to Adam's plan.
 - Do the apportioning according to Jefferson's plan.
5. Consider the following figure.



- Find the perimeter of the figure.
 - Find the area of the figure.
 - Imagine the figure above is the base of a 3-D object of height 4m. What is the volume of that 3-D object?
6. A survey of 50 students gave the following information:
- 35 are taking a science class
 - 18 are taking a history class
 - 11 are taking both a science and a history class
- Draw a Venn diagram representing these data and fill in *every* region of the Venn diagram.
 - How many students are taking science but not history?
 - How many of the students surveyed are taking neither of these classes?

7. Say you want to save up \$2000 for a trip to Oregon in 3 years. To have that much money in 3 years, how much money should you invest now into a bank account earning 12% interest compounded monthly?
8. Consider the following figure.



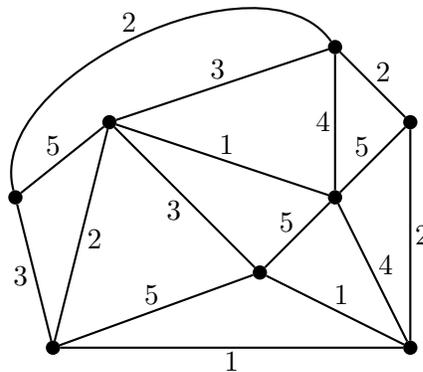
- (a) Find the perimeter of the figure.
- (b) Find the area of the figure.
9. Given statements (i), (ii), and (iii), draw valid conclusions using each type of reasoning (direct, indirect, and transitive reasoning).
- (i) $p \rightarrow \sim q$
- (ii) $\sim q \rightarrow r$
- (a) (iii) $\sim q$, \therefore _____ by direct reasoning
- (b) (iii) p , \therefore _____ by transitive reasoning
- (c) (iii) q , \therefore _____ by indirect reasoning
10. If a given population of elephants doubles in size every 5 years, find the growth rate of the herd in 1 year.
11. Set
- $$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, \quad A = \{1, 3, 7, 9\}, \quad \text{and} \quad B = \{1, 2, 4, 7, 8\}$$
- and perform the following set operations.
- (a) $A \cup B$.
- (b) $\overline{A} \cap B$.
- (c) $|\overline{A \cup B}|$.

12. Say you want to finance a \$350,000 house with a 30-year loan charging 9% interest that is compounded monthly. What will the monthly payments be?
13. In a vote between 3 candidates, the voter preferences are:

(ABC)	(ACB)	(BAC)	(BCA)	(CAB)	(CBA)
12	4	5	10	2	7

Determine the winner, if any, using 3 out of the following 5 voting methods.

- (a) Majority Method
 - (b) Plurality Method
 - (c) Borda Count Method
 - (d) Hare Method
 - (e) Pairwise Comparison Method
14. Is the following argument valid? Use Euler circles to justify your answer.
- Most cars have gasoline engines. Many cars have a sunroof. Therefore, some cars with a sunroof have a gasoline engine.*
15. Use Kruskal's algorithm to find a minimum spanning tree for this weighted graph:



16. Prove or disprove the following:

$$(\sim p \rightarrow q) \leftrightarrow (\sim q \rightarrow p) \text{ is a tautology.}$$