CS2022/ MA 2201 Homework #4
Due *Thursday* 4/20

This homework is the sole work of: _____ whose conference section is at: ___

_____ whose conference section is at: ___

Sources (People, URL's, Books etc.) consulted:

Source _____ for Problem # _____

Source _____ for Problem # _____

Source _____ for Problem # _____

Date: _____

#1. (12 Points) **Review**

a) **Show that A U (B∩C) = (A U B)∩(A U C)**

STEP 1:

A U (B∩C) ⊆ (A U B)∩(A U C)

STEP 2:

(A U B)∩(A U C) ⊆ A U (B∩C)

b) Part a using Using Venn diagrams

c) Show that: f(A ∩ B) ⊆ f(A)

d) Using induction, show 2^n < (n +1)!

#2. (3 Points) **Probability (Section 5.1) #20 What is the probability that a five-card poker hand contains a royal flush, that is, the 10, jack, queen, king and ace of one suit?**

#3. (5 Points) Probability (Section 5.1) #28 To play the Pennsylvania superlottery, a player selects 7 numbers out of the first 80 positive integers. What is the probability that a person wins the grand prize by picking 7 numbers that are among the 11 numbers selected by the Pennsylvania lottery commission?

#4. (4 Points) Relations (Section 7.1): Let A = {1,2} and B = {1, 2, 3} and define binary relation R as:

$(x,y) \varepsilon R \leftrightarrow x - y$ is even

a) State which ordered pairs of A x B are in R

b) Is 1 R 3?,

2 R 3?,

2 R 2? Give reasons

#5. (4 Points) Relations (Section 7.3) Represent the relation of #4

a) using a Zero-One Matrix

b) using a graph

#6. (4 Points) Relations (Section 7.1, 7.4)

a) Show whether the relation below is reflexive, symmetric or transitive. If not, find the reflexive-closure, symmetric-closure and transitive-closure

R = {(0,1), (0,2), (1,1), (1,3), (2,2), (3,0)}

#7. (4 Points) Relations (Section 7.5) Let R be the relation of congruence modulo 3 on the set Z of integers. That is, for all m, n:

m R n ⟷ 3 | (m – n)

Describe the distinct equivalence classes of R.

#8. (4 Points) Relations (Section 7.5) #2 a,d Which of the following is an equivalence relation?
State why or why not

a) **{(a,b) | a and b are the same age}**

b) **{(a,b) | a and b have met**