Math 215
Practice 1st Exam

September 22, 2017

Name (in block capital letters):

Instructor (tick one box): ☐ **Section 1: L. Stanhope (12:50)**

☐ **Section 2: E. Sullivan (12:50)**

Instructions: You are taking this exam under the honor system. Your signature at the bottom of this page is your promise to abide by the conditions described below. Breaking this promise violates Lewis and Clark's academic integrity policy.

1. To answer these questions, use only the knowledge in your head, and a calculator.
2. You have 90 minutes in which to take the exam. This should be one continuous time period, and not two or more periods separated by breaks. (Any breaks you take are included in the 90 minutes.) You may take the exam anywhere you wish. Start timing when you begin the exam.
3. Do not talk to any other student, whether enrolled in Math 215 or not, whether they have already taken the exam or not, about this exam until after 5 PM Friday, September 22nd. That includes: discussing specific questions, its difficulty, how long you worked on it, as well as any other exam-related topic you might imagine.
4. Be sure to carefully read the directions for each problem. Please show your work – correct answers to problems with no justification of where they come from will earn little credit.
5. Finally, do your best to think logically and clearly, and then trust your judgment. There are no "trick" questions here.

Problem	Score
1	
2	
3	
Total	

1. How many ways are there to select an 11-member soccer team and a 5-member basketball team from a class of 30 students if

   (a) Nobody can be on both teams?

   (b) Any number of students can be on both teams?

   (c) At most one student can be on both teams?

2. Consider a standard deck of cards. How many five card poker hands are there with at least one queen and at least one king?

3. Determine whether $(p \to r) \to q$ is logically equivalent to $p \to (r \to q)$ by completing the following truth table:

$((p$	$\longrightarrow$	$r)$	$\longrightarrow$	$q)$	$\longleftrightarrow$	$(\ p \longrightarrow (\ r$	$\longrightarrow$	$q))$
1		1		1				
1		1		0				
1		0		1				
1		0		0				
0		1		1				
0		1		0				
0		0		1				
0		0		0				

   Are they logically equivalent?

4. Reduce the following statment to disjunctive normal form.

$$((\neg p \vee \neg q) \vee r) \wedge ((p \wedge q) \vee r)$$

5. For the statement below please do the following:

   a. Translate the statement into words.

   b. Decide if the statement is true or false.

   c. If the statement is true, provide a proof.

   d. If the statement is false, negate the statement and then provide a proof.

$$\forall \epsilon > 0, \exists \delta > 0, \forall x \in \mathbb{R}, (|x| < \delta \to x^2 < \epsilon)$$