

MATH 200 - Midterm  
Due 3/13/2020, start of class

Instructions: Complete the following exercises, showing all work. In addition to the solution and showing all work, you must provide a short paragraph writeup with the reasoning for your answer. **Homework must be typed, printed, and physically turned in, unless you are turning in the midterm late (then email is acceptable). No exceptions.** Be sure to leave plenty of time to diagnose printer issues or visit one of the various places to print on campus. You are allowed any and all resources at your disposal, including working with each other and using the internet. However, in the case that you work with someone else, be sure to put your reasoning writeups in your own words - it would be considered academic dishonesty otherwise. This exam is out of 100 points, each question is worth 20 points.

Name: \_\_\_\_\_

1. Use a truth table to show that  $((\neg p) \wedge q) \wedge (p \vee (\neg q))$  is a contradiction.
2. Translate the negation of the following statement into symbolic logic: "You can fool some of the people all of the time, and you can fool all of the people some of the time, but you can't fool all of the people all of the time." credit: (not) Abraham Lincoln
3. How many 10 digit integers are odd or have no more than three 3s?
4. At Amelia's Bakery, they produce 8 kinds of cake. On this particular day, they have on hand, 20 con-fetti cakes, 4 red velvet cakes, 15 coffee cakes, 9 crab cakes, 40 mud cakes, 6 patty cakes, 3 cheesecakes, and 9 pancakes. You have been tasked with bringing in to class 5 cakes. How many different cake orders could you have?
5. Show that  $\sum_{k=0}^n \binom{n}{k} \binom{k}{m} = \binom{n}{m} 2^{n-m}$ .