Spring '02 **Math 267 Exam 2 Review** Prof. Brick

1. How many different initials are there for people's names, assuming that there may be as many as two middle names.

2. How many bit strings of length 8 do not contain two consecutive 0's.

3. A jar contains marbles colored blue, green, red, and yellow. Assuming you are blindfolded, how many marbles must you take to be sure to get 7 of the same color ?

4. Let x be an irrational number. Show that the absolute value of the difference between jx and the nearest integer to jx is less than $1/100$ for some positive integer $j \in \{1, 2, 3, \ldots 100\}$.

5. Give a combinatorial proof that $C(n, k) = C(n, n - k)$.

6. Give a combinatorial proof that $2^n = \sum_{k=0}^{n} C(n, k)$

7. An exam consists of 35 true-false questions. Ten of the questions have "true" as the answer. How many answer keys are possible.

8. Prove mathematically that for what we regard as a fair coin, the 4th outcome is independent of the first 3 outcomes.

9. You draw 2 cards. Find the probability that the second one is a king given that the first one is a heart.

10. Find the probability of getting a full house in 5-card poker.

11. Find the recurrence relation for the number of ways of climbing n stairs, assuming you can take them one or two stairs at a time.

12. Prove that the relation on integers of "divides" is transitive.

13. Sketch the graph of the relation $\{(2, 3), (6, 2), (4, 4), (4, 6)\}$

14. Consider the set of subsets of the set $\{1, 2\}$ and the partial ordering given by inclusion. Draw the Hasse diagram.

15. Let $f : X \to Y$ be a function. Define a relation R on X by $x_1 R x_2$ iff $f(x_1) = f(x_2)$. Prove that R is an equivalence relation.

16. Review everything else.