Name:_____

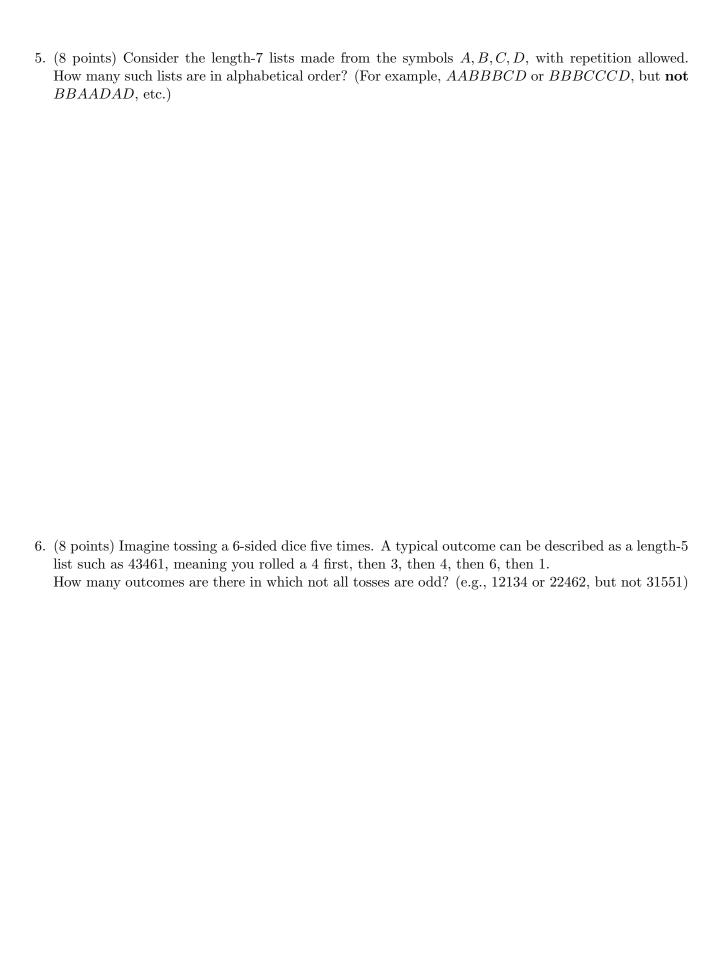
R. Hammack

Score:

Directions Except in a problem designated **short answer**, you must show your work to get full credit. This test is closed-book and closed-notes. No calculators or other electronic devices are allowed. Simplify your answers if it is easy to do so, but you may leave complex answers unsimplified, as in, for example, $7^{15} - 7!$. All you will need is something to write with. Scratch paper will be provided.

- 1. (9 points) Short answer.
 - (a) Write $\{\ldots -5, -2, 1, 4, 7, 10, 13, 16 \ldots\}$ in set-builder notation.
 - (b) Write the set $\left\{\frac{n}{n+1} : 1 \le n \le 3\right\}$ by listing its elements between braces.
 - (c) $\mathscr{P}(\{1,2\}) =$
- 2. (12 points) Short answer. Suppose $A = \{1, 2\}$ and $B = \{2, 4\}$.
 - (a) $A \times A =$
 - (b) $A \times B =$
 - (c) $(A \times A) (A \times B) =$
 - (d) $(A \times A) \cap (A \times B) =$
- 3. (9 points) Write a truth table for the expression $\neg P \lor (Q \Rightarrow R)$.

4. (20 points) Consider length-4 lists made from the symbols A, B, C, D , with repetition allowed			
	(a)	How many such lists are there?	
	(b)	How many such lists are there that have at least one A ?	
	()		
	(c)	How many such lists are there that begin with B and end with A ?	
	(d)	How many such lists are there that begin with B or end with A ?	



7	(10	points
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(a) How many subsets $X \subseteq \{1,2,3,4,5,6,7,8,9\}$ are there for which |X|=5?

(b) Write Pascal's triangle to the 5th row and use it to expand $(x+y)^5$.

8. (8 points) How many 8-digit positive integers have no 0's and exactly four 6's?

