Math 303

p. 90

#3. (a) Yes

1 2 3 4 5
| | | | |
m n o p q

(b) Yes

a b c d e f g h i j k l m
| | | | | | | | | | | | |
1 2 3 4 5 6 7 8 9 10 11 12 13

(c) No

m a t h e i c s
| | | | | | | |
1 2 3 4 5 6 7 8 9 10 11

#4. (a) $6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$ (b) $n! = n(n-1)(n-2)(n-3)\cdots(3)(2)(1)$

#5. (a) $4 \cdot 3 \cdot 2 \cdot 1 = 24$ (b) $3 \cdot 2 \cdot 1 = 6$ (c) $(3 \cdot 2 \cdot 1)(2 \cdot 1) = 12$

#7. (a) $1100 - 100 = 1000$ (b) $\frac{1001+1}{2} = \frac{1002}{2} = 501$

(c) $n\{1^0, 2^1, 2^2, 2^3, 2^4, \ldots, 2^{10}\}$
$= 11$

(d) 100

(e) $n\{2, 3, 4, 5, 6\}$
$= 5$

#9. (a) $B \subset C$

$n(B) < n(C) = 8$

The maximum number possible in B would be 7.

(b) The least number possible in B would be 0.

#10. $C \subseteq D$ and $D \subseteq C$

Therefore, $D = C$

(a) $n(C) = n(D) = 5$ (b) $C = D$.

#14. (a)

a b c
| | | | | |
1 2 3 4 5 ... 100

$\{a,b,c\} \sim \{1,2,3\}$

$\{1,2,3\} \subset \{1,2,3,\ldots,100\}$

$n(\{a,b,c\}) = 3$

$n(\{1,2,3,\ldots,100\}) = 100$

$3 = n(\{a,b,c\}) < n(\{1,\ldots,100\}) = 100$

(b) $\emptyset \subset \{a,b,c\}$

$0 = n(\emptyset) < n(\{a,b,c\}) = 3$

$0 < 3$.

p. 90

\# 15. The question is asking for the number of possible 3-element subsets of a set with 7 elements.

$$\frac{7!}{4!3!} = \frac{7\cdot6\cdot5}{3\cdot2} = 7\cdot5 = 35 \quad \left[\frac{\#\text{ of }\sout{\text{orderings}}\text{ choices}}{\#\text{ of ways of ordering the 3 chosen}}\right]$$

There are 35 possible subcommittees.

\#16. $\underset{\uparrow}{\underline{9}} \cdot \underset{\uparrow}{\underline{9}} = 81$

$\{1,2,3,\ldots,9\}$ $\{0,1,2,\ldots,9\} - \{1\text{st choice}\}$

There are 81 2-digit base ten numerals that can be formed where the first digit is not zero and no digit is repeated.

p. 92 #7. If sets A and B are finite sets with $a = n(A)$ and $b = n(B)$, we say a is less than or equal to b ($a \leq b$) provided $A \subseteq B$ (A is a subset of B).

\#10. [Answers will vary.]