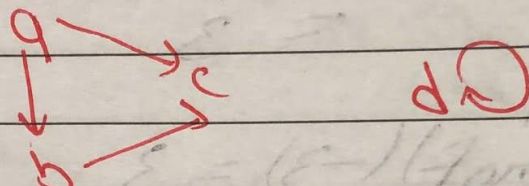


1. Epps problem 8.1.14 1494

(14)

$S = \{(a,b), (a,c), (b,c), (d,d)\}$



2\*Epp5 problem 8.2.14 / 503

Relation  $\phi$ :  $m-n$  is odd

• Reflexive: No,  
for  $m=n$ ,  $m-n=0$ , which is not  
 $\phi$  odd.

• Symmetric: Yes  
If  $m-n$  is odd, then  $n-m$  is  
also odd w/z  $n-m = -(m-n)$

• Transitive: No

If  $m-n$  and  $n-p$  are both odd  
their sum  $(m-n) + (n-p) = m-p$  is  
even, which violates the  
condition for  $m-p$  to be odd.



3. Epp 5 problem 8.2.21/504

Given,

$X = \{a, b, c\}$  and  $P(X)$  is

the power set of  $X$ .

$A \varepsilon B \Leftrightarrow$  the no. of elements in

$A =$  the no. of element in  $B$

**Reflexive:-** A relation is reflexive if for every element  $A \in P(X)$ ,  $A \varepsilon A$  holds. In <sup>this</sup> case, since  $A$  always has the same no. of elements as itself,  $\varepsilon$  is reflexive.

**Symmetric:** A relation is symmetric if whenever  $A \varepsilon B$ , it also hold  $B \varepsilon A$ . In this case, if  $A$  has the same no. of elements as  $B$ , then  $B$  also has the same number of element as  $A$ . Therefore,  $\varepsilon$  is symmetric.



Transitive: A relation is transitive if whenever  $A \sim B$  and  $B \sim C$ , we also have  $A \sim C$ . In this case, if  $A$  has the same number of element as  $B$ , and  $B$  has the same no. of elements as  $C$ , then  $A$  must have the same number of elements as  $C$ . Therefore,  $\sim$  is transitive.

Conclusion:

The relation  $\sim$  on  $\mathcal{P}(X)$  is reflexive, symmetric and transitive.

4. Epps problem 8.1.8 (571)

$\{11, 22, 33, 44, 55, 66\}$

Total possible =  $6 \times 6 = 36$

same number = 6

So,

$$P(E) = \frac{N(E)}{N(S)} = \frac{6}{36}$$

$$= \frac{1}{6}$$

$$\approx 16.67\%$$



S. Epps problem 9.1.10/571

Possible outcomes:

Sum = 9: (3,6), (4,5), (5,4), (6,3)

Sum = 10: (4,6), (5,5), (6,4)

Sum = 11: (5,6), (6,5)

Sum = 12: (6,6)

Outcomes:-

$E = \{36, 45, 54, 63, 46, 55, 64, 56, 65, 66\}$

$N(E) = 10$

Total possible =  $6 \times 6 = 36$

Probability of event

$$P(E) = \frac{10}{36} \approx 27.78\%$$



6. Epps problem 9.5.2 / 630

a.

List: all 3-combinations

For set  $S = \{x_1, x_2, x_3, x_4, x_5\}$

1. set of  $S$  (1,2) (1,3) (1,4) (1,5)

(2,3) (2,4) (2,5)

(1,2,3) (1,2,4) (1,2,5)

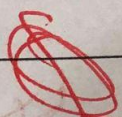
(1,3,4) (1,3,5) (1,4,5)

(2,3,4) (2,3,5) (2,4,5)

(1,2,3,4) (1,2,3,5) (1,2,4,5)

(1,3,4,5) (2,3,4,5)

The 3-combination:



$$\binom{5}{3} = 10$$

$$10 = 1 \times 2 \times 3 = 6$$

there are 10 combinations

b.

List 2-combination  $\{x_1, x_2, x_3, x_4, x_5\}$

$$= \binom{5}{2} \text{ is } 10$$

For  $x_1, x_2, x_3, x_4, x_5$  (1,2) (1,3) (1,4) (1,5) (2,3) (2,4) (2,5) (3,4) (3,5) (4,5) --- 10

2. Epps problem 9.5.4 1630

$$\text{for } P(8,3) = \binom{8}{3} \times 3!$$