**MT131 (M131): Discrete Mathematics**

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**Q−1:**

1. and .

They are equivalent because

* ***R***

1. and .

They are equivalent because

* *( P ( P*

*( (*

1. and .

They are not equivalent because

* *(*
* *(*

**Q­−2:**

1. .

Which is **true** because the statement express that **For some** x values integers ,

So we may check one value at least to be true example

x = 0 *Z*

(0 + 0 <= 0)

1. For all positive integers is a prime.

Because the statement express that **For all** x values integers , So we may check one values to find one False value for example

n=41 (positive integer)

**412**+41+41=1763 (**NOT PRIME)** 1763/41 = 43

So it is **False Statement**

1. For integers; if divides , then either divides or divides .

Which is **False** as example

6|36 = 6|4\*9

6 doesn’t divide neither 4 nor 9 **T 🡪 F**

**T 🡪 F**

1. .

d) .

Which is **True** because **All values are true because of equal signs in the both sided**

**for negative x**

**True**

**for positive x**

**True**

**Q­−3:**

1. **where .**

Suppose p = 1 and q = 2

(1/2) = 2

(4/8) = 8 = (1/2)

Has **multiple value** in co-domain Which mean that **(x) is not function**

1. **where** .

**g(x) is not function** because we find **no** image in co-domain for **x=3** at the domain (set of integers Z) , According to intervals define

= **?!**

1. **where** .

**h (x) is not function** because we find **no** image in co-domain for the domain at **x= -5**

**x= (-5)**

1. **where .**

**is not function** because we find multiple value (more than one image) in co-domain for an element **x=3** at the domain (N)

n=3

k (3) =3

k (3) =4

k (3) =5

**Q­−4:**

1. How many words begin with R **and** end with T?

**= 1\*1\*265 = 11,881,376**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| R | 26 possible letter | 26 | 26 | 26 | 26 | T |

1. How many words begin with A **or** end with B?

**P(A**

**= 266+266 - 265 = 605,950,176**

1. How many words begin with A or B and end with A or B?

**= 2\*265 \*2 = 4  265** = **47,525,504**

1. How many words begin with A or B or end with A or B?

**=2\*266+266\*2 - 4\*265 = 1,188,137,600**

1. How many words begin with a vowel **and** end with a vowel?

Possible vowel letters = 5

**= 5\*5\*265 = 25  265** **=297,034,400**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 5 possible vowels | 26 | 26 | 26 | 26 | 26 | 5 |
|  |  |  |  |  |  |  |

1. How many words begin with a vowel or end with a vowel?

**= 5\*266+5\*266 25 265= 2,792,123,360**

1. How many words begin with AAB in some order?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | A | B | 26 | 26 | 26 | 26 |

**= 3\*264 = 1,370,928**

1. How many words have exactly one vowel?

**= 5\*7\*216 = 3,001,814,235**

**Q­−5:**

1. *p* (sum of the two numbers picked is < 4).

**{(1,1), (1,2), (2,1)}**

**p(x\*y<4) = =**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1 | 2,1 | 3,1 | 4,1 | 5,1 | 6,1 | 7,1 | 8,1 |
| 1,2 | **2,2** | **3,2** | **4,2** | **5,2** | **6,2** | **7,2** | **8,2** |
| 1,3 | **2,3** | **3,3** | **4,3** | **5,3** | **6,3** | **7,3** | **8,3** |
| 1,4 | **2,4** | **3,4** | **4,4** | **5,4** | **6,4** | **7,4** | **8,4** |
| 1,5 | **2,5** | **3,5** | **4,5** | **5,5** | **6,5** | **7,5** | **8,5** |
| 1,6 | **2,6** | **3,6** | **4,6** | **5,6** | **6,6** | **7,6** | **8,6** |
| 1,7 | **2,7** | **3,7** | **4,7** | **5,7** | **6,7** | **7,7** | **8,7** |
| 1,8 | **2,8** | **3,8** | **4,8** | **5,8** | **6,8** | **7,8** | **8,8** |

1. *p* (both numbers match).

{(**1,1), (2,2), (3,3),(4,4),(5,5),(6,6),(7,7),(8,8)}**

**p(x=y) = = =**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1 | 2,1 | 3,1 | 4,1 | 5,1 | 6,1 | 7,1 | 8,1 |
| 1,2 | **2,2** | **3,2** | **4,2** | **5,2** | **6,2** | **7,2** | **8,2** |
| 1,3 | **2,3** | **3,3** | **4,3** | **5,3** | **6,3** | **7,3** | **8,3** |
| 1,4 | **2,4** | **3,4** | **4,4** | **5,4** | **6,4** | **7,4** | **8,4** |
| 1,5 | **2,5** | **3,5** | **4,5** | **5,5** | **6,5** | **7,5** | **8,5** |
| 1,6 | **2,6** | **3,6** | **4,6** | **5,6** | **6,6** | **7,6** | **8,6** |
| 1,7 | **2,7** | **3,7** | **4,7** | **5,7** | **6,7** | **7,7** | **8,7** |
| 1,8 | **2,8** | **3,8** | **4,8** | **5,8** | **6,8** | **7,8** | **8,8** |

1. *p* (the sum of the two numbers is a prime).

**Possible primes by sums = 1+2+4+6+6+4+2=23**

**P(x+y) = prime=**

**A prime number is 2,3,5,7,11,13**

**{(1,1), (1,2), (2,1), (2,3), (3,2), (1,4), (4,1), (3,4), (4,3),……. (8,5)}**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1 | 2,1 | 3,1 | 4,1 | 5,1 | 6,1 | 7,1 | 8,1 |
| 1,2 | **2,2** | **3,2** | **4,2** | **5,2** | **6,2** | **7,2** | **8,2** |
| 1,3 | **2,3** | **3,3** | **4,3** | **5,3** | **6,3** | **7,3** | **8,3** |
| 1,4 | **2,4** | **3,4** | **4,4** | **5,4** | **6,4** | **7,4** | **8,4** |
| 1,5 | **2,5** | **3,5** | **4,5** | **5,5** | **6,5** | **7,5** | **8,5** |
| 1,6 | **2,6** | **3,6** | **4,6** | **5,6** | **6,6** | **7,6** | **8,6** |
| 1,7 | **2,7** | **3,7** | **4,7** | **5,7** | **6,7** | **7,7** | **8,7** |
| 1,8 | **2,8** | **3,8** | **4,8** | **5,8** | **6,8** | **7,8** | **8,8** |

1. P (your number is greater than your friend's number).

**Ways of being greater =**

**1(number below) +2 (numbers below) +3+4+5+6+7= 28**

**P(x>y)=**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1 | 2,1 | 3,1 | 4,1 | 5,1 | 6,1 | 7,1 | 8,1 |
| 1,2 | **2,2** | **3,2** | **4,2** | **5,2** | **6,2** | **7,2** | **8,2** |
| 1,3 | **2,3** | **3,3** | **4,3** | **5,3** | **6,3** | **7,3** | **8,3** |
| 1,4 | **2,4** | **3,4** | **4,4** | **5,4** | **6,4** | **7,4** | **8,4** |
| 1,5 | **2,5** | **3,5** | **4,5** | **5,5** | **6,5** | **7,5** | **8,5** |
| 1,6 | **2,6** | **3,6** | **4,6** | **5,6** | **6,6** | **7,6** | **8,6** |
| 1,7 | **2,7** | **3,7** | **4,7** | **5,7** | **6,7** | **7,7** | **8,7** |
| 1,8 | **2,8** | **3,8** | **4,8** | **5,8** | **6,8** | **7,8** | **8,8** |