Matt Pennella

Suppose $A = \{U, V, X\}$ & $B = \{b\}$

a. Show $A \times B$

$\{(U, b), (V, b), (X, b)\}$

b. what is power set of A

$\{\emptyset, \{U\}, \{V\}, \{X\}, \{U, V\}, \{U, X\}, \{V, X\}, \{U, V, X\}\}$

$\boxed{7.2 \mid 17}$

$f(x) = \dfrac{3x-1}{x} \quad \forall x \in \mathbb{R},\ x \neq 0$

Andy Krasner

For a function to be one-to-one, $f(x_1) = f(x_2)$ iff $x_1 = x_2$.

Proof Suppose $x_1 = x_2$. Then $\dfrac{3x_1 - 1}{x_1} = \dfrac{3x_2 - 1}{x_2}$

$$x_2(3x_1 - 1) = x_1(3x_2 - 1)$$

$$3x_1x_2 - x_2 = 3x_1x_2 - x_1$$

$$\cancel{3x_1x_2} - \cancel{3x_1x_2} - x_2 = -x_1$$

$$-x_2 = -x_1$$

$$\underline{\underline{x_1 = x_2}}$$

Therefore $f(x)$ is one-to-one. $\square$

6.1 #11 Kirsten C

11. $A = \{0 < x \leq 2\}$
$B = \{1 \leq x < 4\}$
$C = \{3 \leq x < 9\}$

$A \cup B$
a. $0 < x \leq 2$, $1 \leq x < 4$ $\boxed{0 < x < 4}$

$A \cap B$
b. $1 \leq x \leq 2$

A^c
c. $0 \geq x > 2$

$A \cup C$
d. $0 < x \leq 2$ or $3 \leq x < 9$

$A \cap C$
e. empty

B^c
f. $1 > x \geq 4$

$A^c \cap B^c$
g. $x < 1$, $x \geq 4$, $x \leq 0$, $x > 2$
$x \leq 0$ or $x \geq 4$

$A^c \cup B^c$
h. $x < 1$ $x > 2$

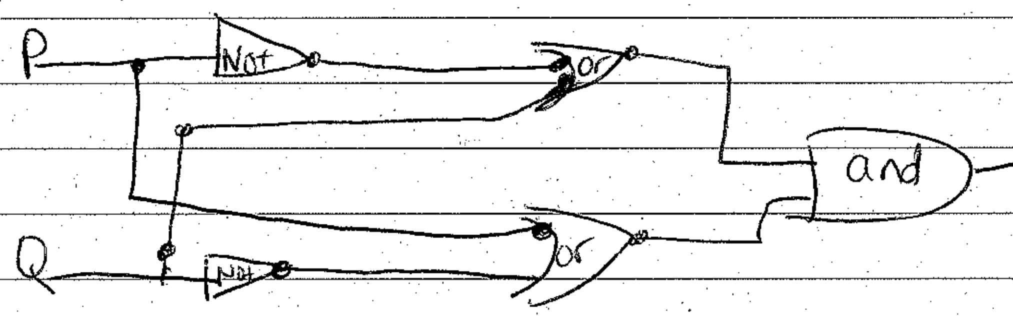
$(A \cap B)^c$
i. $x < 1$ $x > 2$) =

) =

$(A \cup B)^c$
j. $x \leq 0$ or $x \geq 4$

James Ianro
CS 201 - Quiz

1) ~~Design a~~ ~~cir~~ What equation does the circuit create?



Answer:

$= (\sim P \vee Q) \wedge (\sim Q \vee P)$

$\equiv (P \to Q) \wedge (Q \to P)$

$\equiv (P \leftrightarrow Q)$

by DeMorgan's law.

Equation: $(P \Leftrightarrow Q)$
Biconditional.

Dan McNamara

10:00 MWF

Quiz 4

Prove by Mathematical Induction:

$$1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad \text{for all integers } n \geq 1$$

Solution:

$$P(n) \rightarrow 1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad \forall \mathbb{Z}\ n \geq 1$$

Basis: $P(1) \rightarrow 1^2 = 1 = \frac{1(1+1)(2+1)}{6} = \frac{6}{6} = 1$ ✓

Ind. Hyp: Suppose $P(k)$ is true $\rightarrow 1^2 + 2^2 + \dots + k^2 = \frac{k(k+1)(2k+1)}{6} \quad \forall \mathbb{Z}\ k \geq 1$

[Show that $P(k+1)$ is true]

$$\rightarrow 1^2 + 2^2 + \dots + (k+1)^2 = \frac{(k+1)((k+1)+1)(2(k+1)+1)}{6} \quad \forall \mathbb{Z}\ k \geq 1$$

$$= \frac{(k+1)(k+2)(2k+3)}{6}$$

Left side:

$$1^2 + 2^2 + \dots + (k+1)^2 = 1^2 + 2^2 + \dots + k^2 + (k+1)^2$$

$$= \frac{k(k+1)(2k+1)}{6} + (k+1)^2 \quad \text{by Ind. Hyp (Subst.)}$$

$$= \frac{k(k+1)(2k+1)}{6} + \frac{6(k+1)^2}{6}$$

$$\frac{(k+1)[k(2k+1) + 6(k+1)]}{6}$$

$$= \frac{(k+1)(2k^2 + 7k + 6)}{6}$$

$$= \frac{(k+1)(k+2)(2k+3)}{6}$$

which is what we wanted to show

QED

Tesker

Question:

In how many ways can the word "Permutation" be arranged, while keeping the letters 'p' and 'e' adjacent and the letters 'o' and 'n' adjacent?

Answer: $\underbrace{Pe}_{1}\ \underset{2}{r}\ \underset{3}{m}\ \underset{4}{u}\ \underset{5}{t}\ \underset{6}{a}\ \underset{7}{t}\ \underset{8}{i}\ \underbrace{on}_{9} \Rightarrow 9!$

$\underbrace{eP}_{1}\ \underset{2}{r}\ \underset{3}{m}\ \underset{4}{u}\ \underset{5}{t}\ \underset{6}{a}\ \underset{7}{t}\ \underset{8}{i}\ \underbrace{on}_{9} \rightarrow 9!$

$\underbrace{Pe}\ r\ m\ u\ t\ a\ t\ i\ \underbrace{no} \rightarrow 9!$

$\underbrace{eP}\ r\ m\ u\ t\ a\ t\ i\ \underbrace{no} \rightarrow 9!$

So, $9! + 9! + 9! + 9! = 362880 + 362880 + 362880 + 362880$

$\boxed{= 1451520 \text{ ways}}$

Gloria Mendoza

Answer To Review Question

~~$b_n = 2n+5$~~

$b_0 = 2$

$b_1 = 4 \cdot 2 + 5$

$b_2 = 4(4 \cdot 2 + 5) + 5 = 4^2 \cdot 2 + 4 \cdot 5 + 5$

$b_3 = 4(4(4 \cdot 2 + 5) + 5) + 5 = 4^3 \cdot 2 + 4^2 \cdot 5 + 4 \cdot 5 + 5$

$b_4 = 4(\qquad) = 4^4 \cdot 2 + 4^3 \cdot 5 + 4^2 \cdot 5 + 4 \cdot 5 + 4$

$$b_n = 4^n \cdot 2 + \sum_{i=0}^{n-1} 5 \cdot 4^i \qquad \sum_{i=0}^{n} r^i = \frac{r^{n+1} - 1}{r-1}$$

$$b_n = 4^n \cdot 2 + 5 \cdot \sum_{i=0}^{n-1} 4^i$$

$$b_n = 4^n \cdot 2 + 5 \cdot \left(\frac{4^n - 1}{3}\right)$$