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Logic Symbols: ≥ ≤ ≠ ¬ ⋀ ⋁ ⊕ ≡ → ↔ ∃ ∀ Set Symbols: ∈ ∉ ⊆ ⊂ ⊇ ⊃ ∅ ∪ ∩ ×
Quiz 4

1
Let A = {x | -2 <x ≤ 4}, B = {x | -9≤ x ≤ 1} and C = {x | 2 ≤x< 4}, where x represents an integer number. Determine the sets $(A-C) \cup A$, and $B \cap C^c$.

$(A-C) \cup A$ = (A-C) = {x ∈ R | -2<x<2 } then $(A-C) \cup A$ = {x ∈ R | -2<x<=4 }

(A ∩ B) – C= (A∩B)= {x ∈ R | -2<x<=1 } then (A ∩ B) – C= {x ∈ R | -2<x<=1 }

$B \cap C^C$ = {x ∈ R | -9≤ x ≤ 1}

2

Use an element argument to prove the statement:

For all sets A and B, $(A \cup B)^c \subseteq A^c \cap B^c$

Suppose x ∈ $(A \cup B)^C$. By definition of complement, x ∉ A and x ∉ B. This states that x is not an element of either A or B. Therefore, x is not an element in $(A \cup B)^C$ and follows that x is not in $A^C \cap B^C$. Hence we can conclude that $(A \cup B)^C \subseteq A^C \cap B^C$.

3

For all sets A and B, simplify the given expression,

A – (A ∩ B)

Cite a property from Theorem 6.2.2 for every step of the proof. Theorem 6.2.2.png

$A-(A \cap B) = A \cap (A \cap B)^C$ by the set difference law
$= A \cap (A^C \cup B^C)$ by DeMorgan's Law
$= (A \cap A^C) \cup (A \cap B^C)$ by associative laws
$= (\varnothing) \cup (A \cap B^C)$ by the complement laws
$= (A \cap B\ C) \cup (\varnothing)$ by the commutative law
$= (A \cap B\ C)$ by the identity law
$= A-B$ by the set difference law

4

What are the terms a_0, a_1, a_2 and a_3 of the sequence $\{a_n\}$, where a_n equals:

1) $a_n=(-1)^{n+2}*n^2$, For all n> =0

2) $a_n=5$

1 : a(0)= (-1)^(2) * (0)^2 = 1
a(1)= (-1)^(3) * (1)^2 = -1
a(2)= (-1)^(4) * (2)^2= 4
a(3)= (-1)^(5) * (3)^2 = -9

2 : a(0) =5
a(1) =5
a(2) =5
a(3) =5

5

Given that, $1k(k+1)=1k-1k+1$. Use this identity to find a simple expression for

. $\sum_{k=1}^{n+1}$ 1/(k(k+1)= (1/1 – ½)+(1/2 -1/3)+ (1/3-1/4)+…+ (1/(k-1) – 1/k)+(1/k – 1/(k+1)

=**1-1/(k+1)**

Compute the following summations. (Instructions: Showing your work is necessary and you must make use of the formula provided in the attached document summation_formula.pdf . An intermediate form will be acceptable, so you don't need to calculate the final result.)

a) ∑5i=3(7i+6)

b) ∑3k=0(3^{k+3})

c) ∑5j=2 (2*(-2)j)

a

∑5i=3(7i+6) = ∑5i=3(7i+6) - ∑i=1 (7i+6) = ((7*(3(3+1))/2) +6) - ((7*(2(2+1))/2) +6)

=((7*(3(4))/2) +6) - ((7*(2(3))/2) +6)

b

∑3k=0(3^{k+3}) = ∑($3^k 3^3$) = 9∑ (3^k) = (9 * 3^(3+1) – 1)/3-1 = $\frac{9 * (3^4 - 1)}{2}$

c

∑5j=2 (2*(-2)j) = 2∑$(-2)^j$ - 2∑$(-2)^j$ = 2*(((-2)^(5+1))-1)/(2-1)) – 2*(((-2)^(1+1))-1)/(2-1))

=2*(((-2)^(6))-1)/(1)) – 2*(((-2)^(2))-1)/(1))