Review for Exam 2 MAT 2440 Halleck Sp 18



This is equivalent to B−A, i.e., elements in B not in A: {0,1,2,6}

Start with larger set (B) and then add elements from A not in B: {0,1,2,3,6,4,5}={0,1,2,3,4,5,6 }

Already done in (a)

Union already done (b), so find its complement, but the union is U, so {} or Æ

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | C | BÇC | AÈ(BÇC) | AÈB | AÈC | (AÈB)Ç(AÈC) |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

We have verified the identity since the columns corresponding to each side of the identity are the same. This is the easiest, but other solutions are possible including using a Venn diagram and LHS ⊆ RHS and vice versa.





AÈCc

A

C

B

AÇBÇC

A−B

(A−B)ÇC

B

C

A



B

A

BÇC

C

[AÈ(BÇC)]c



(a) f onto Þ ∀c, ∃b f(b) = c; g onto Þ ∃a g(a) = b; Þ ∀c, ∃a f ° g(a) = c \ f ° g is onto

(b) f ° g(a1) = f ° g(a2), f 1:1Þ g(a1) = g(a2), g 1:1Þ a1 = a2

é7/8ù = 1 é17/8ù = 3 é1001/8ù = 126

1-1: f(a)=−2a+7=−2b+7=f(b) Þ a=b; onto: given y, let x= (7−y)/2

Ø1-1: f(2,1)=f(−2,1)=2; Ø onto: Range = N ¹ Z

Ø1-1: f(−1)=f(1)=1; Ø onto: Range Ì N Ì Z so Range ¹ Z

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| n | 0 | 1 | 2 | 3 | 4 |
| an | 0+2/1=2 | 1+2/2=2 | 8+2/3=26/3 | 27+2/4=55/2 (or 27.5) | 64+2/5 = 64.4 |



1, − 2, 4, −8, 16

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| n | 0 | 1 | 2 | 3 |
| an | 2 | 2(1)+2=4 | 2(2)+4=8 | 2(3)+8=14 |

Using Microsoft Excel, find the 101st term (= a100) (Below is an embedded spreadsheet, right click and select open to see the full sheet. Once open, do ctrl-~ to see the formulas.)



9. Using Microsoft Excel, find the following sums. (Hint: for the second one, create a 2-dimensional array).

 



Ào­ : 1, −1, 2, −2, 4, −4, 5, −5, 7, −7, 8, −8,….

not Ào­ :  use diagonal argument (restrict to numbers between 0 and 1). Assume that the #’s can be listed. This time if ith member of sequence has 0 as its ith digit, switch to 1 and vice-versa. By this process, we create a sequence different from all the sequences listed, contradicting assumption.



Ào­ : (1,1), (2,1), (1,2), (2,2), (1,3), (2,3), …. Or use ((-1)n/2+3/2, én/2ù )

**procedure** *sum*(*a*1, *a*2, …., *a*n: integers)

 *sum* := *a*1

 **for** *i* := 2 to *n*

 sum := sum + *ai*

 return *sum* {*sum* is the sum of elements in the sequence}



**procedure** *sum*(*a*1, *a*2, …., *a*n: integers) {we are assuming n>1)

 *diff* := *a*2 − *a*1

 **for** *i* := 3 to *n*

 new := *a*n − *a*n−1

 if new < diff, diff := new

 return *diff* {*diff* is the smallest difference between consecutive elements in the sequence}



**procedure** *maxmin*(*a*1, *a*2, …., *a*n: integers)

 *max* := *a*1, *min* := *a*1

 **for** *i* := 2 to *n*

 if *max* < *ai* then *max* := *ai*

 if *min* > *ai* then *max* := *ai*

 return (*max, min*) {(*max, min*)is ordered pair of largest, smallest elements}



See answer on right. Note that the number of comparisons (potential swaps) decreases for

for each pass (4, 3, 2, 1, 0). The entries that no longer undergo comparisons are in red.



We use “insert” (provided in class) as a subprocedure

and note how many comparisons happen

within that call of the subprocedure.

77/18 = 4 R 5 so 4 18¢ and 1 5¢

43/18 = 2 R 7 so 2 18¢, 1 5¢ and 2 1¢

24/18 = 1 R 6 so 1 18¢, 1 5¢ and 1 1¢