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Section- B
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1. Different Operations On Set

```
> U:= {0,4,6,7,2,19,18,44,21,84,91,26,29};
```
$$U := \{0, 2, 4, 6, 7, 18, 19, 21, 26, 29, 44, 84, 91\} \quad (1)$$

```
> with(combinat, randcomb)
```
$$[randcomb] \quad (2)$$

```
> A := randcomb(U, 4);
```
$$A := \{18, 19, 29, 91\} \quad (3)$$

```
> B := randcomb(U, 3);
```
$$B := \{2, 44, 84\} \quad (4)$$

```
> A union B;
```
$$\{2, 18, 19, 29, 44, 84, 91\} \quad (5)$$

```
> A intersect B;
```
$$\varnothing \quad (6)$$

```
> A minus B;
```
$$\{18, 19, 29, 91\} \quad (7)$$

```
> with(combinat, powerset)
```
$$[powerset] \quad (8)$$

```
> powerset(A);
```
$$\{\varnothing, \{18\}, \{19\}, \{29\}, \{91\}, \{18, 19\}, \{18, 29\}, \{18, 91\}, \{19, 29\}, \{19, 91\}, \{29, 91\}, \{18, 19, 29\}, \{18, 19, 91\}, \{18, 29, 91\}, \{19, 29, 91\}, \{18, 19, 29, 91\}\} \quad (9)$$

```
> `union`(op(map(y -> map(x->[x, y], A), B)) );
```
$$\{[18, 2], [18, 44], [18, 84], [19, 2], [19, 44], [19, 84], [29, 2], [29, 44], [29, 84], [91, 2], [91, 44], [91, 84]\} \quad (10)$$

```
> U minus A;
```
$$\{0, 2, 4, 6, 7, 21, 26, 44, 84\} \quad (11)$$

```
> U minus B;
```
$$\{0, 4, 6, 7, 18, 19, 21, 26, 29, 91\} \quad (12)$$

```
> C := randcomb(U, 2);
```
$$C := \{7, 44\} \quad (13)$$

```
> C := A union B;
```
$$C := \{2, 18, 19, 29, 44, 84, 91\} \quad (14)$$

```
> C intersect B;
```
$$\{2, 44, 84\} \quad (15)$$

```
> A intersect(B intersect C);
```

2.Counting problems using Maple

$$\{18, 19, 29, 91\}\ \{2, 44, 84\} \quad (16)$$

```
> with(combinat, permute)
```

$$[permute] \quad (17)$$

```
> permute([a, b, c, d], 2);
```

$$[[a, b], [a, \{6, 18\}], [a, d], [b, a], [b, \{6, 18\}], [b, d], [\{6, 18\}, a], [\{6, 18\}, b], [\{6, 18\}, d], [d, a], [d, b], [d, \{6, 18\}]] \quad (18)$$

```
> permute([1, 2, 3, 4, 5, 6], 3);
```

$$[[1, 2, 3], [1, 2, 4], [1, 2, 5], [1, 2, 6], [1, 3, 2], [1, 3, 4], [1, 3, 5], [1, 3, 6], [1, 4, 2], [1, 4, 3], [1, 4, 5], [1, 4, 6], [1, 5, 2], [1, 5, 3], [1, 5, 4], [1, 5, 6], [1, 6, 2], [1, 6, 3], [1, 6, 4], [1, 6, 5], [2, 1, 3], [2, 1, 4], [2, 1, 5], [2, 1, 6], [2, 3, 1], [2, 3, 4], [2, 3, 5], [2, 3, 6], [2, 4, 1], [2, 4, 3], [2, 4, 5], [2, 4, 6], [2, 5, 1], [2, 5, 3], [2, 5, 4], [2, 5, 6], [2, 6, 1], [2, 6, 3], [2, 6, 4], [2, 6, 5], [3, 1, 2], [3, 1, 4], [3, 1, 5], [3, 1, 6], [3, 2, 1], [3, 2, 4], [3, 2, 5], [3, 2, 6], [3, 4, 1], [3, 4, 2], [3, 4, 5], [3, 4, 6], [3, 5, 1], [3, 5, 2], [3, 5, 4], [3, 5, 6], [3, 6, 1], [3, 6, 2], [3, 6, 4], [3, 6, 5], [4, 1, 2], [4, 1, 3], [4, 1, 5], [4, 1, 6], [4, 2, 1], [4, 2, 3], [4, 2, 5], [4, 2, 6], [4, 3, 1], [4, 3, 2], [4, 3, 5], [4, 3, 6], [4, 5, 1], [4, 5, 2], [4, 5, 3], [4, 5, 6], [4, 6, 1], [4, 6, 2], [4, 6, 3], [4, 6, 5], [5, 1, 2], [5, 1, 3], [5, 1, 4], [5, 1, 6], [5, 2, 1], [5, 2, 3], [5, 2, 4], [5, 2, 6], [5, 3, 1], [5, 3, 2], [5, 3, 4], [5, 3, 6], [5, 4, 1], [5, 4, 2], [5, 4, 3], [5, 4, 6], [5, 6, 1], [5, 6, 2], [5, 6, 3], [5, 6, 4], [6, 1, 2], [6, 1, 3], [6, 1, 4], [6, 1, 5], [6, 2, 1], [6, 2, 3], [6, 2, 4], [6, 2, 5], [6, 3, 1], [6, 3, 2], [6, 3, 4], [6, 3, 5], [6, 4, 1], [6, 4, 2], [6, 4, 3], [6, 4, 5], [6, 5, 1], [6, 5, 2], [6, 5, 3], [6, 5, 4]] \quad (19)$$

3.Recursion and induction usin-g Maple

```
> F := proc(n)
  options remember;
  if (n < 3) then RETURN(1)
  else RETURN(F(n-1)+F(n-2))
  fi
  end;
```

$$F := \mathbf{proc}(n) \quad (20)$$

$$\quad \mathbf{option}\ remember;$$

$$\quad \mathbf{if}\ n < 3\ \mathbf{then}\ RETURN(1)\ \mathbf{else}\ RETURN(F(n-1)+F(n-2))\ \mathbf{end\ if}$$

$$\mathbf{end\ proc}$$

```
> S := proc(n)
  options remember :
  if (n = 0) then RETURN(0)
  else RETURN(S(n - 1) + n)
   fi
   end;
```

$$S := \mathbf{proc}(n) \quad (21)$$

```
    option remember;
    if n = 0 then RETURN(0) else RETURN(S(n - 1) + n) end if
end proc
```

```
> F(3);
```

$$2 \tag{22}$$

```
> F(4);
```

$$3 \tag{23}$$

```
> F(5);
```

$$5 \tag{24}$$

```
> S(3);
```

$$6 \tag{25}$$

```
> S(4);
```

$$10 \tag{26}$$

```
> isPowerofTwo := x ->
  evalb(type(simplify(log[2](n)),integer));
   B := proc(n)
  options remember;
  if isPowerofTwo(n) then RETURN(1)
  else RETURN(B(n-1) + 2)
  fi
  end;
```

$$isPowerofTwo := x \mapsto evalb\left(type\left(simplify\left(\log_2(n)\right), integer\right)\right)$$

$$B := \mathbf{proc}(n) \tag{27}$$

```
    option remember;
    if isPowerofTwo(n) then RETURN(1) else RETURN(B(n - 1) + 2) end if
end proc
```

```
>
```