

JATISH KUMAR

Exercise 1

(a) $\{1, 4, 9, 16, 25\}$

Upper bound = 25, 26

Lower bound = 0, 1

(b) $\{x \in \mathbb{R} : x < 0\}$

Upper bound = 0, 1

Lower bound = No lower bound

(c) $\{1 + \frac{1}{2^n} : n \in \mathbb{N}\}$

Upper bound = 2, 3

Lower bound = 0, 1

(d) $\{x+1 : x \in \mathbb{R}\}$

Upper bound = No upper bound

Lower bound = No lower bound

(e) $[0, 2] \cup (3, 4)$

Upper bound = 4, 5

Lower bound = 0,

ATISH KUMAR

Exercise 2

Infimum = In exercise (a) set a have infimum that is 1. And set d have infimum that is 0.

Maximum = In exercise (1) set a have maximum that is 25. And set d have maximum that is 4

Exercise 3 :

The limit of the sequence (x_n) is $5/3$ or 1.66666 . Because when we see the sequence it is go closer to the 1.6666 .

SATISH KUMAR

```
(%i1) /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ] */
      /* [ Created with wxMaxima version 14.12.1 ] */
```

```
      /* [wxMaxima: input    start ] */
      N:20;
```

```
(%o1) 20
```

```
(%i2) x[0]:1;
      x[1]:2;
      for n:0 thru N do (
        x[n + 2]: 1/2*(x[n] + x[n+1])
      );
```

```
(%o2) 1
```

```
(%o3) 2
```

```
(%o4) done
```

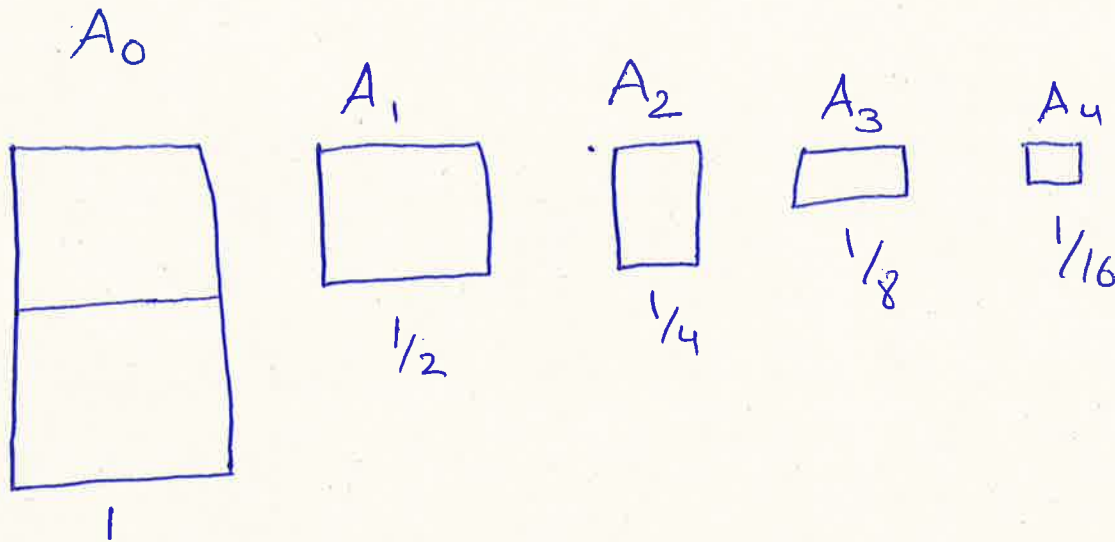
```
(%i5) for n:0 thru N do (
      display( float(x[n]) )
    );
```

$\text{float}(1) = 1.0$
 $\text{float}(2) = 2.0$
 $\text{float}\left(\frac{3}{2}\right) = 1.5$
 $\text{float}\left(\frac{7}{4}\right) = 1.75$
 $\text{float}\left(\frac{13}{8}\right) = 1.625$
 $\text{float}\left(\frac{27}{16}\right) = 1.6875$
 $\text{float}\left(\frac{53}{32}\right) = 1.65625$
 $\text{float}\left(\frac{107}{64}\right) = 1.671875$
 $\text{float}\left(\frac{213}{128}\right) = 1.6640625$
 $\text{float}\left(\frac{427}{256}\right) = 1.66796875$
 $\text{float}\left(\frac{853}{512}\right) = 1.666015625$
 $\text{float}\left(\frac{1707}{1024}\right) = 1.6669921875$
 $\text{float}\left(\frac{3413}{2048}\right) = 1.66650390625$
 $\text{float}\left(\frac{6827}{4096}\right) = 1.666748046875$
 $\text{float}\left(\frac{13653}{8192}\right) = 1.6666259765625$
 $\text{float}\left(\frac{27307}{16384}\right) = 1.66668701171875$
 $\text{float}\left(\frac{54613}{32768}\right) = 1.666656494140625$
 $\text{float}\left(\frac{109227}{65536}\right) = 1.666671752929688$
 $\text{float}\left(\frac{218453}{131072}\right) = 1.666664123535156$
 $\text{float}\left(\frac{436907}{262144}\right) = 1.666667938232422$
 $\text{float}\left(\frac{8}{5}\right) = 1.666666030883789$

```
(%o5) done
```

ANATISH KUMAR

Bonus Exercise -



The area of the A_0 is 1 m^2 than we cut it into two equal pieces.

then the area of $A_1 = \frac{\text{Area of } A_0}{2} = \frac{1}{2} \text{ m}^2$

than we cut A_1 in two equal pieces

then the area of $A_2 = \frac{\text{Area of } A_1}{2} = \frac{1}{4} \text{ m}^2$

than again we cut A_2 in two equal pieces the the area of $A_3 = \frac{\text{Area of } A_2}{2} = \frac{1}{8} \text{ m}^2$

Again we cut A_3 in two equal pieces than the area of $A_4 = \frac{\text{Area of } A_3}{2} = \frac{1}{16} \text{ m}^2$

$$\begin{array}{l} \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots \\ \frac{1}{2^1}, \frac{1}{2^2}, \frac{1}{2^3}, \frac{1}{2^4}, \dots \\ = \frac{1}{2^n} \end{array} \quad \left| \begin{array}{l} \text{Yes it look like} \\ \text{family. It is} \\ \frac{1}{2^n}, n \in \mathbb{N} \end{array} \right.$$