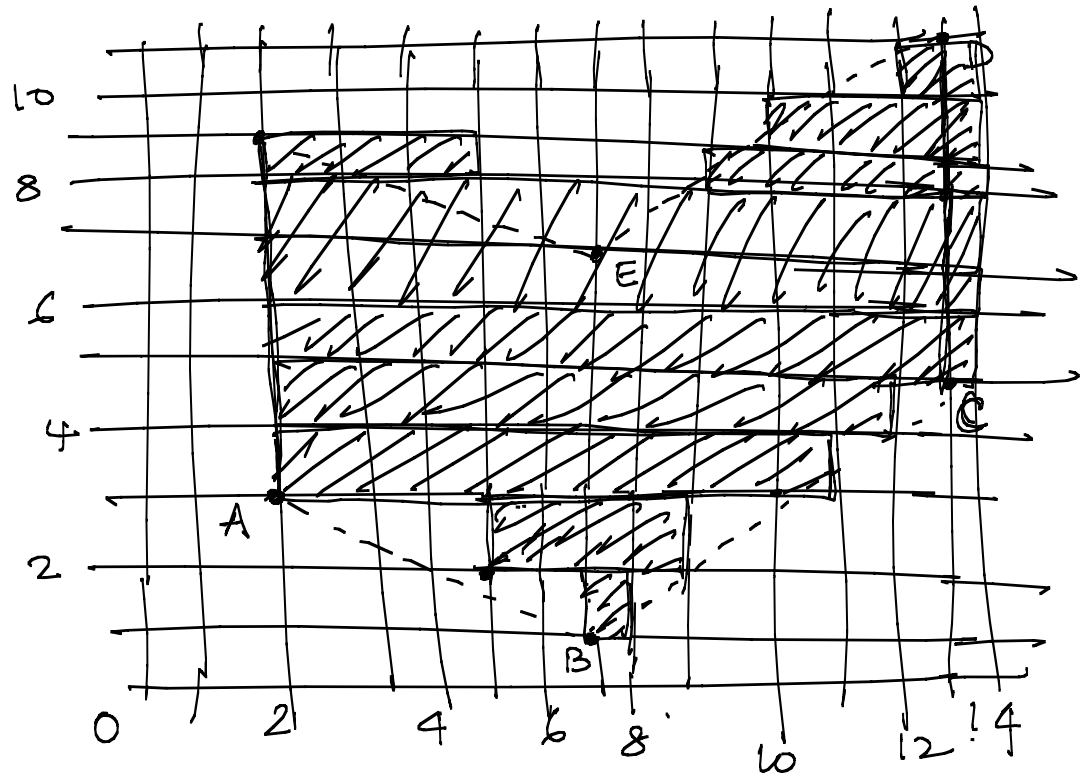
Edge Bucket Method for Polygon Scan Conversion

Note Title 2/14/2006

Polygon

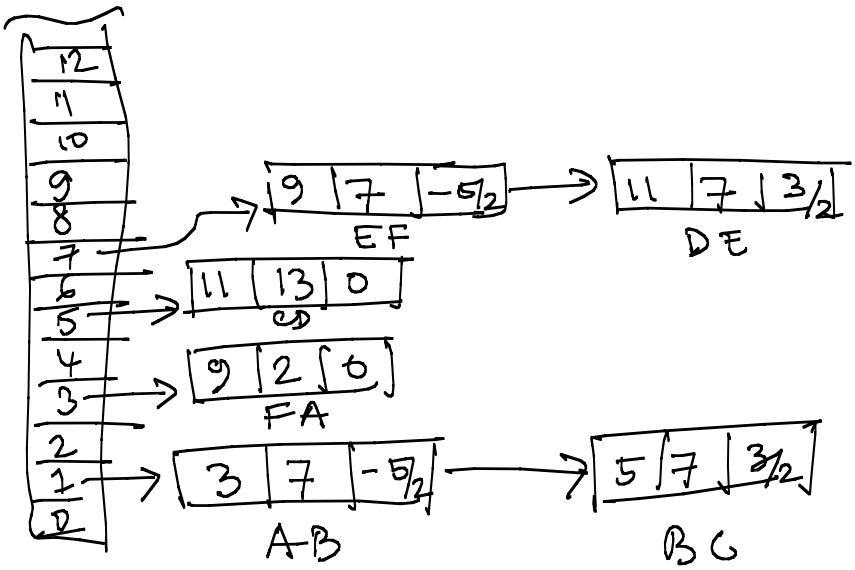
Given as an ordered list of vertices.

E.g. A (2, 3), B (7, 1), C (13, 5),
D (13, 11), E (7, 7), F (2, 9)



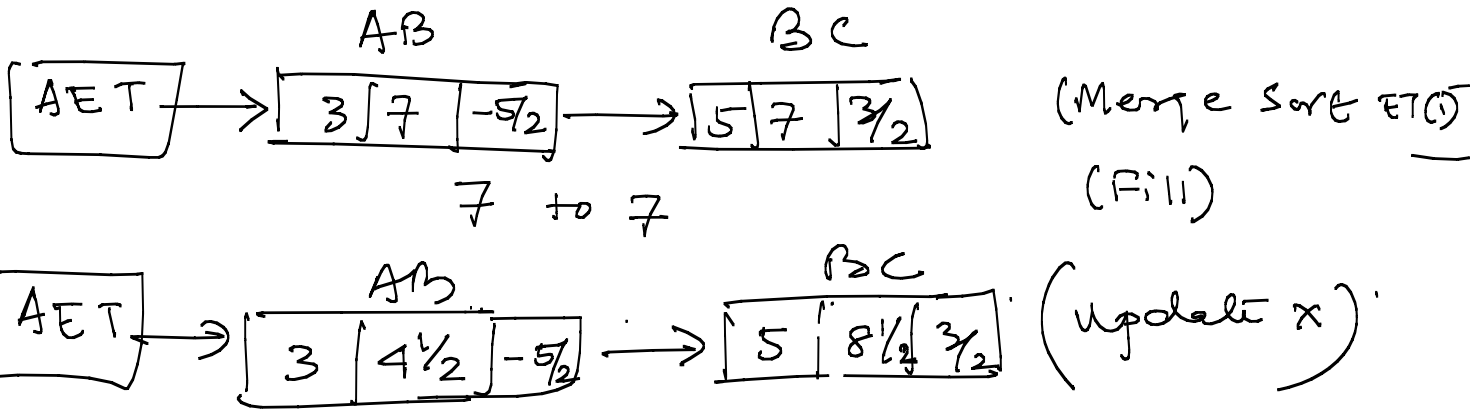
Edges	y_{min}	x	y_{max}	$\frac{dx}{dy}$	
AB	1	7	3	$-5/2$	$\left(\frac{7-2}{1-3}\right)$
BC	1	7	5	$3/2$	$\left(\frac{7-13}{1-5}\right)$
CD	5	13	11	0	$\left(\frac{13-13}{5-11}\right)$
DE	7	7	11	$3/2$	$\left(\frac{13-7}{11-7}\right)$
EF	7	7	9	$-5/2$	$\left(\frac{2-7}{9-7}\right)$
FA	3	2	9	0	$\left(\frac{2-2}{9-3}\right)$

Edge Table (ET)



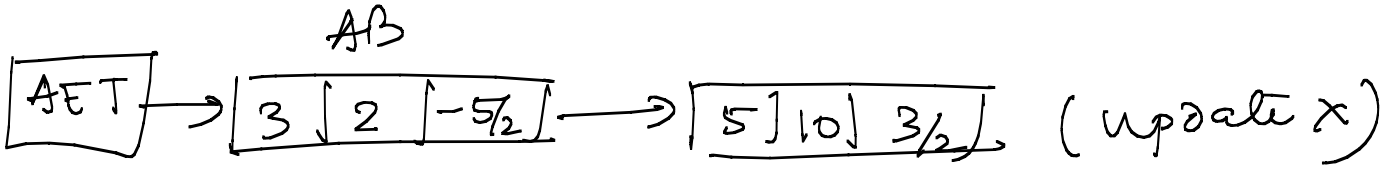
$y_{min} \rightarrow 1$ $y_{max} \rightarrow 11$.

$y = 1$

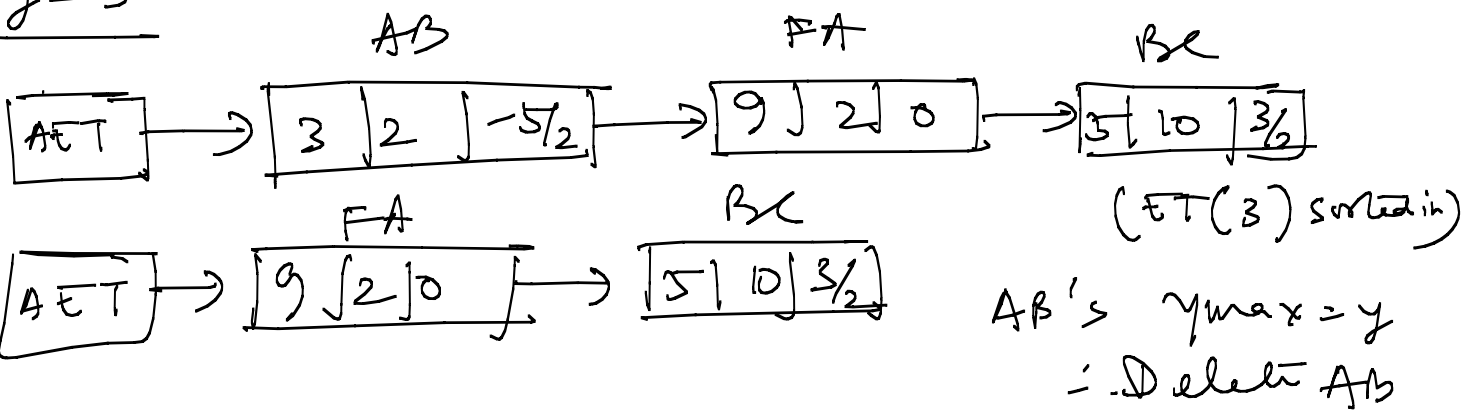


$y = 2$

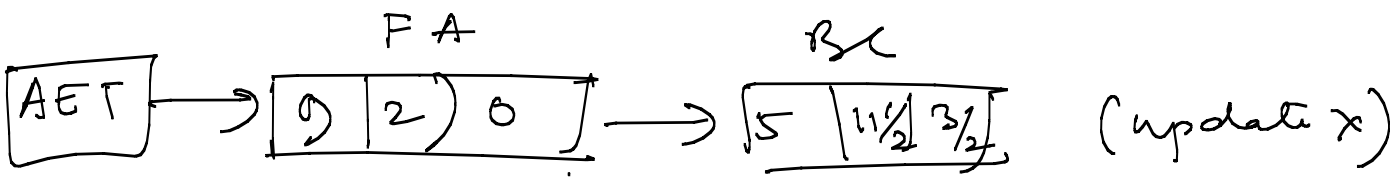
- ET(2) is empty, ∴ AET unchanged
- Fill [4½] & [8½], 5 → 8



$y = 3$



Fill 2 to 10

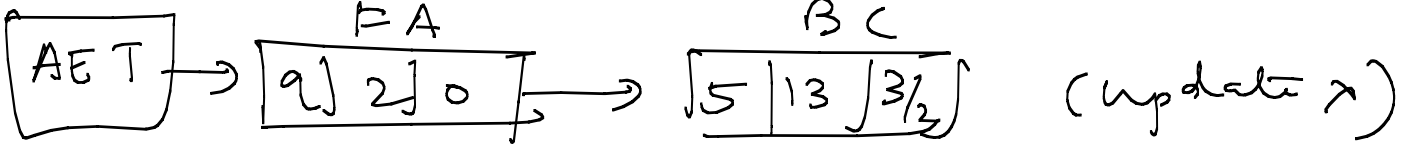


(update x)

$y = 4$

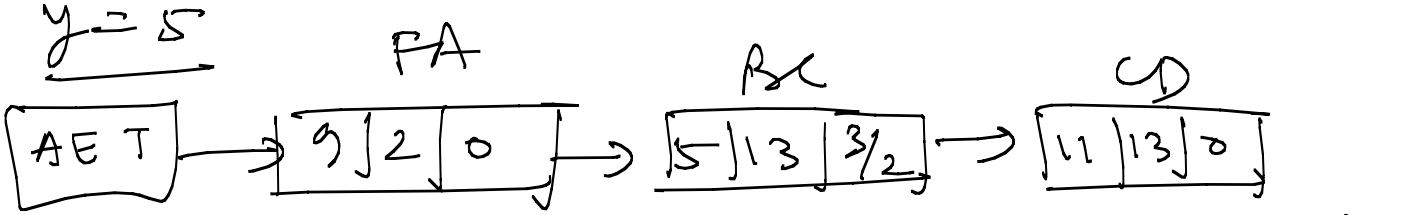
ET(4) is empty ∴ AET unchanged

Fill [2] – [11½] ∴ 2 to 11



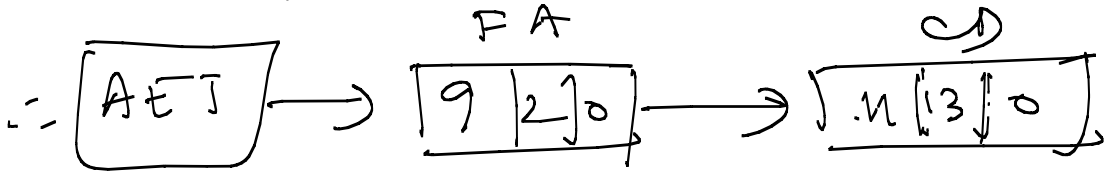
(update x)

$y = 5$



(ET(5) in)

since y_{max} of BC = 5, delete BC



Fill 2 to 13

update x leads to no change since $\frac{dx}{dy} = 0$

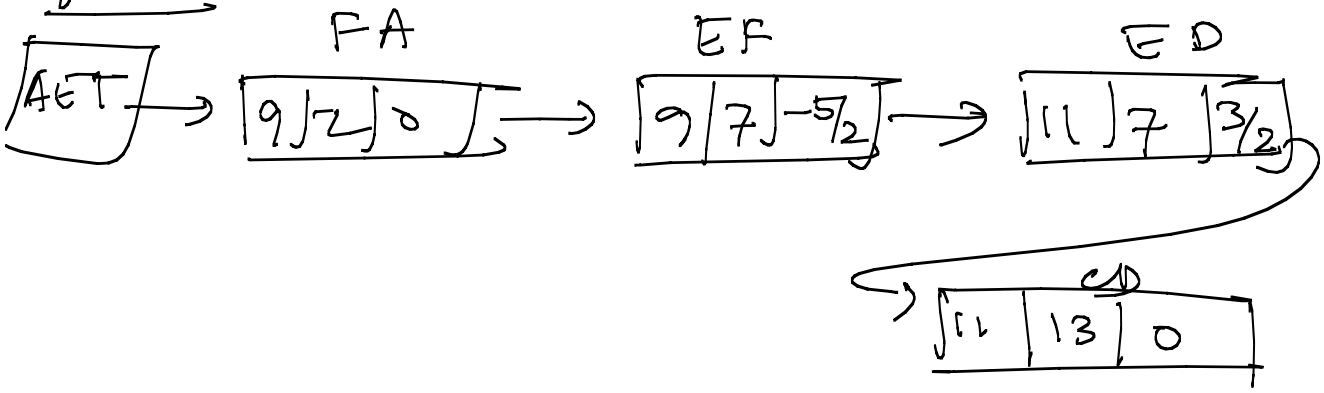
$y = 6$

ET(6) is empty, AET is unchanged.

Fill 2 to 13

$\frac{dx}{dy} = 0$, ∴ AET unchanged.

$y = 7$

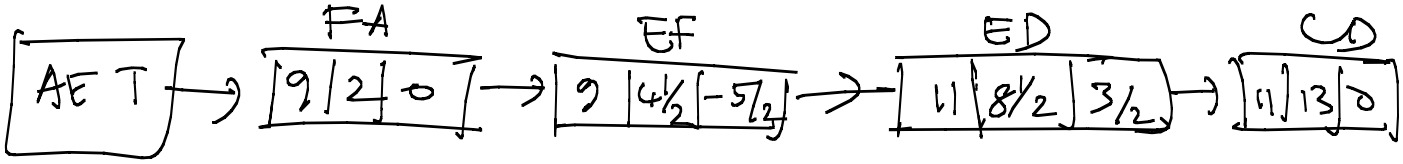


(ET(7) in)

Now ET is empty.

Fill 2-7, 7-13.

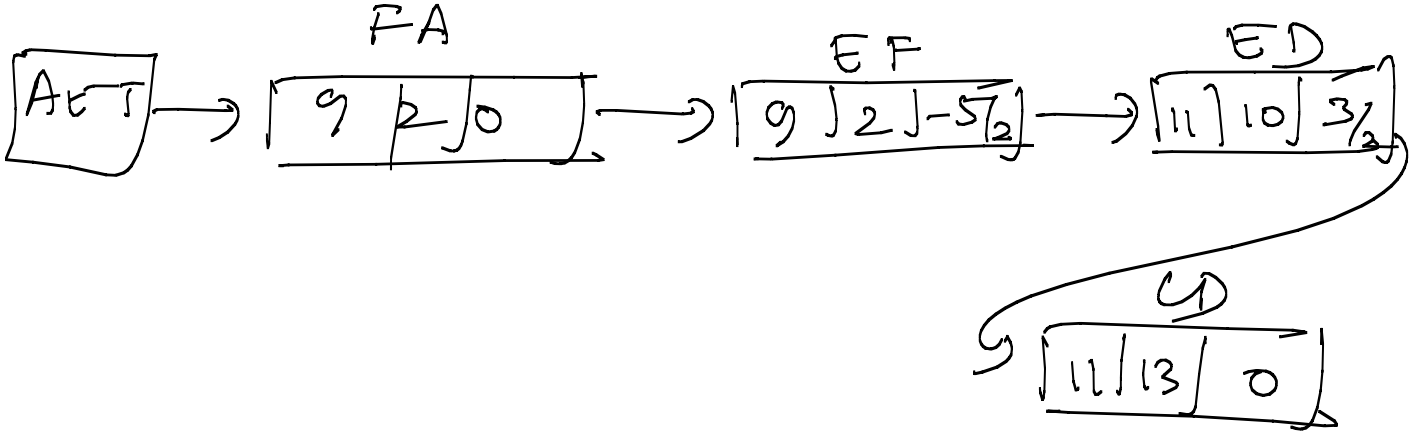
∴ Fill 2-13



$y = 8$

ET empty, ∴ AET unchanged

Fill 2 – 4 & 9 – 13

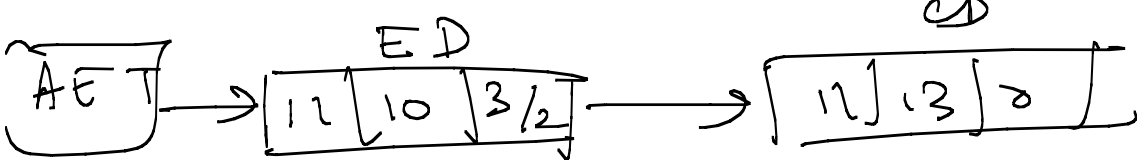


(update x)

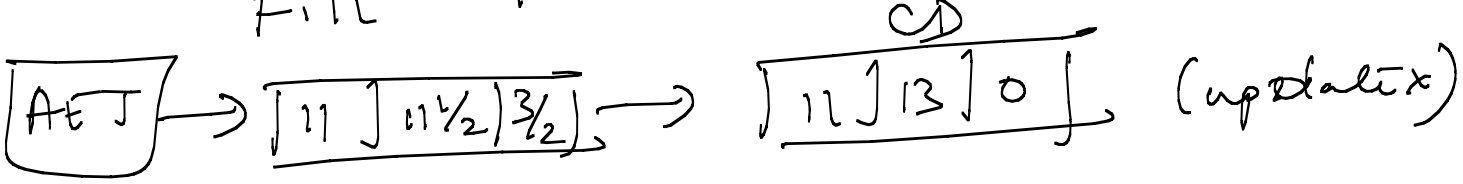
$y = 9$

ET empty, ∴ AET same.

FA & EF has $y_{max} = 9$ ∴ Deleted



Fill 10 – 13

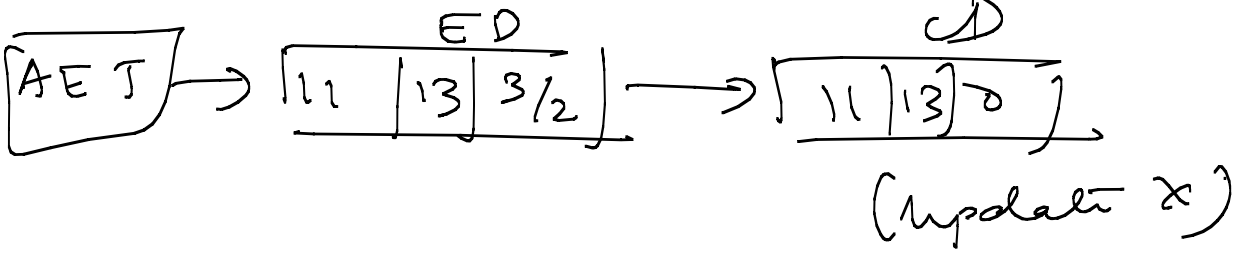


(update x)

$y = 10$

ET empty, ∴ AET same.

· Fill 12 – 13



(Update x)

$y = 11$

ET empty, ∴ AET same.

ED & CD have $y_{max} = 11$

∴ Deleted.

∴ AET empty.

∴ Scan Converted Polygon.