Dibujo de primitivas en 2D.

Dibujar por el algoritmo incremental y el algoritmo de Bresenham

L1 (15, 22) (25, 25)

L2 (10, 12) (15, 22)

L3 (23, 18) (28, 28)

L4 (18, 30) (25, 38)

L5 (22, 15) (28, 18)

L1 (15, 22) (25, 25)

**Algoritmo incremental.**

m = (25-22)/(25-15) = 0.3

|m| <= 1 por lo tanto Dx = 1 y Dy = 0.3

X0 = 16

Y0 = 22 + 0.3 redondea al entero más cercano Y0 = 22

|  |  |  |  |
| --- | --- | --- | --- |
| K | Xk | Yk real | Yk |
| 0 | 16 | 22.3 | 22 |
| 1 | 17 | 22.6 | 23 |
| 2 | 18 | 22.9 | 23 |
| 3 | 19 | 23.2 | 23 |
| 4 | 20 | 23.5 | 24 |
| 5 | 21 | 23.8 | 24 |
| 6 | 22 | 24.1 | 24 |
| 7 | 23 | 24.4 | 24 |
| 8 | 24 | 24.7 | 25 |
| 9 | 25 | 25 | 25 |

**Algoritmo de Bresenham.**

∆y = 3

∆x = 10

2∆y = 6

2∆y - 2∆x = - 14

p0 = 2 ∆y - ∆x = -4

Como pk < 0 entonces (xk+1, yk) = (16,22) y pk + 1 = pk + 2 ∆y = 2

|  |  |  |  |
| --- | --- | --- | --- |
| K | Pk | (Xk+1, Yk+1) |  |
| 0 | 2 | (16,22) | Como pk > 0 entonces  (xk+1, yk+1) = (17,23)  Pk+1 = pk + 2 ∆y - 2∆x= -12 |
| 1 | -12 | (17,23) | Como pk < 0  (xk+1, yk) = (18,23)  Pk+1 = pk + 2 ∆y = -6 |
| 2 | -6 | (18,23) | Como pk < 0  (xk+1, yk) = (19,23)  Pk+1 = pk + 2 ∆y = 0 |
| 3 | 0 | (19,23) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (20,24)  Pk+1 = pk + 2 ∆y - 2∆x= -14 |
| 4 | -14 | (20,24) | Como pk < 0  (xk+1, yk) = (21,24)  Pk+1 = pk + 2 ∆y = -8 |
| 5 | -8 | (21,24) | Como pk < 0  (xk+1, yk) = (22,24)  Pk+1 = pk + 2 ∆y = -2 |
| 6 | -2 | (22,24) | Como pk < 0  (xk+1, yk) = (23,24)  Pk+1 = pk + 2 ∆y = 4 |
| 7 | 4 | (23,24) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (24,25)  Pk+1 = pk + 2 ∆y - 2∆x= -10 |
| 8 | -10 | (24,25) | Como pk < 0  (xk+1, yk) = (25,25)  Pk+1 = pk + 2 ∆y = -4 |
| 9 | -4 | (25,25) |  |

L2 (10, 12) (15, 22)

**Algoritmo incremental.**

m = (22-12)/(15-10) = 2

|m| ≥ 1 por lo tanto Dx = 1/2 y Dy = 1

Y0 = 13

X0 = 10 + 0.5 redondea al entero más cercano Y0 = 11

|  |  |  |  |
| --- | --- | --- | --- |
| K | Xk real | Xk | Yk |
| 0 | 10.5 | 11 | 13 |
| 1 | 11 | 11 | 14 |
| 2 | 11.5 | 12 | 15 |
| 3 | 12 | 12 | 16 |
| 4 | 12.5 | 13 | 17 |
| 5 | 13 | 13 | 18 |
| 6 | 13.5 | 14 | 19 |
| 7 | 14 | 14 | 20 |
| 8 | 14.5 | 15 | 21 |
| 9 | 15 | 15 | 22 |

**Algoritmo de Bresenham.**

∆y = 10

∆x = 5

2∆x = 10

2∆x - 2∆y = -10

p0 = 2 ∆x - ∆y = 0

Como pk ≥ 0 entonces (xk+1, yk+1) = (11,13) y Pk+1 = pk + 2 ∆x - 2∆y = -10

|  |  |  |  |
| --- | --- | --- | --- |
| K | Pk | (Xk+1, Yk+1) |  |
| 0 | -10 | (11,13) | Como pk < 0  (xk, yk+1) = (11,14)  Pk+1 = pk + 2 ∆x = 0 |
| 1 | 0 | (11,14) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (12,15)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 2 | -10 | (12,15) | Como pk < 0  (xk, yk+1) = (12,16)  Pk+1 = pk + 2 ∆x = 0 |
| 3 | 0 | (12,16) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (13,17)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 4 | -10 | (13,17) | Como pk < 0  (xk, yk+1) = (13,18)  Pk+1 = pk + 2 ∆x = 0 |
| 5 | 0 | (13,18) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (14,19)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 6 | -10 | (14,19) | Como pk < 0  (xk, yk+1) = (14,20)  Pk+1 = pk + 2 ∆x = 0 |
| 7 | 0 | (14,20) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (15,21)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 8 | -10 | (15,21) | Como pk < 0  (xk, yk+1) = (15,22)  Pk+1 = pk + 2 ∆x = 0 |
| 9 | 0 | (15,22) |  |

L3 (23, 18) (28, 28)

**Algoritmo incremental.**

m = (28-18)/(28-23) = 2

|m| ≥ 1 por lo tanto Dx = 1/2 y Dy = 1

Y0 = 19

X0 = 23 + 0.5 redondea al entero más cercano Y0 = 24

|  |  |  |  |
| --- | --- | --- | --- |
| K | Xk real | Xk | Yk |
| 0 | 23.5 | 24 | 19 |
| 1 | 24 | 24 | 20 |
| 2 | 24.5 | 25 | 21 |
| 3 | 25 | 25 | 22 |
| 4 | 25.5 | 26 | 23 |
| 5 | 26 | 26 | 24 |
| 6 | 26.5 | 27 | 25 |
| 7 | 27 | 27 | 26 |
| 8 | 27.5 | 28 | 27 |
| 9 | 28 | 28 | 28 |

**Algoritmo de Bresenham.**

∆y = 10

∆x = 5

2∆x = 10

2∆x - 2∆y = -10

p0 = 2 ∆x - ∆y = 0

Como pk ≥ 0 entonces (xk+1, yk+1) = (24,19) y Pk+1 = pk + 2 ∆x - 2∆y = -10

|  |  |  |  |
| --- | --- | --- | --- |
| K | Pk | (Xk+1, Yk+1) |  |
| 0 | -10 | (24,19) | Como pk < 0  (xk, yk+1) = (24,20)  Pk+1 = pk + 2 ∆x = 0 |
| 1 | 0 | (24,20) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (25,21)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 2 | -10 | (25,21) | Como pk < 0  (xk, yk+1) = (25,22)  Pk+1 = pk + 2 ∆x = 0 |
| 3 | 0 | (25,22) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (26,23)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 4 | -10 | (26,23) | Como pk < 0  (xk, yk+1) = (26,24)  Pk+1 = pk + 2 ∆x = 0 |
| 5 | 0 | (26,24) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (27,25)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 6 | -10 | (27,25) | Como pk < 0  (xk, yk+1) = (27,26)  Pk+1 = pk + 2 ∆x = 0 |
| 7 | 0 | (27,26) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (28,27)  Pk+1 = pk + 2 ∆x - 2∆y = -10 |
| 8 | -10 | (28,27) | Como pk < 0  (xk, yk+1) = (28,28)  Pk+1 = pk + 2 ∆x = 0 |
| 9 | 0 | (28,28) |  |

L4 (18, 30) (25, 38)

**Algoritmo incremental.**

m = (38-30)/(25-18) = 8/7

|m| ≥ 1 por lo tanto Dx = 7/8 y Dy = 1

Y0 = 31

X0 = 18 + 0.875 redondea al entero más cercano Y0 = 19

|  |  |  |  |
| --- | --- | --- | --- |
| K | Xk real | Xk | Yk |
| 0 | 18.875 | 19 | 31 |
| 1 | 19.75 | 20 | 32 |
| 2 | 20.625 | 21 | 33 |
| 3 | 21.5 | 22 | 34 |
| 4 | 22.375 | 22 | 35 |
| 5 | 23.25 | 23 | 36 |
| 6 | 24.125 | 24 | 37 |
| 7 | 25 | 25 | 38 |

**Algoritmo de Bresenham.**

∆y = 8

∆x = 7

2∆x = 14

2∆x - 2∆y = -2

p0 = 2 ∆x - ∆y = 6

Como pk ≥ 0 entonces (xk+1, yk+1) = (19,31) y Pk+1 = pk + 2 ∆x - 2∆y = 4

|  |  |  |  |
| --- | --- | --- | --- |
| K | Pk | (Xk+1, Yk+1) |  |
| 0 | 4 | (19,31) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (20,32)  Pk+1 = pk + 2 ∆x - 2∆y = 2 |
| 1 | 2 | (20,32) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (21,33)  Pk+1 = pk + 2 ∆x - 2∆y = 0 |
| 2 | 0 | (21,33) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (22,34)  Pk+1 = pk + 2 ∆x - 2∆y = -2 |
| 3 | -2 | (22,34) | Como pk < 0  (xk, yk+1) = (22,35)  Pk+1 = pk + 2 ∆x = 12 |
| 4 | 12 | (22,35) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (23,36)  Pk+1 = pk + 2 ∆x - 2∆y = 10 |
| 5 | 10 | (23,36) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (24,37)  Pk+1 = pk + 2 ∆x - 2∆y = 8 |
| 6 | 8 | (24,37) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (25,38)  Pk+1 = pk + 2 ∆x - 2∆y = 6 |
| 7 | 6 | (25,38) |  |

L5 (22, 15) (28, 18)

**Algoritmo incremental.**

m = (18-15) /(28-22) = 0.5

|m| <= 1 por lo tanto Dx = 1 y Dy = 0.5

X0 = 23

Y0 = 15 + 0.5 redondea al entero más cercano Y0 = 16

|  |  |  |  |
| --- | --- | --- | --- |
| K | Xk | Yk real | Yk |
| 0 | 23 | 15.5 | 16 |
| 1 | 24 | 16 | 16 |
| 2 | 25 | 16.5 | 17 |
| 3 | 26 | 17 | 17 |
| 4 | 27 | 17.5 | 18 |
| 5 | 28 | 18 | 18 |

**Algoritmo de Bresenham.**

∆y = 3

∆x = 6

2∆y = 6

2∆y - 2∆x = -6

p0 = 2 ∆y - ∆x = 0

Como pk ≥ 0 entonces (xk+1, yk+1) = (23,16) y Pk+1 = pk + 2 ∆y - 2∆x= -6

|  |  |  |  |
| --- | --- | --- | --- |
| K | Pk | (Xk+1, Yk+1) |  |
| 0 | -6 | (23,16) | Como pk < 0  (xk+1, yk) = (24,16)  Pk+1 = pk + 2 ∆y = 0 |
| 1 | 0 | (24,16) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (25,17)  Pk+1 = pk + 2 ∆y - 2∆x= -6 |
| 2 | -6 | (25,17) | Como pk < 0  (xk+1, yk) = (26,17)  Pk+1 = pk + 2 ∆y = 0 |
| 3 | 0 | (26,17) | Como pk ≥ 0 entonces  (xk+1, yk+1) = (27,18)  Pk+1 = pk + 2 ∆y - 2∆x= -6 |
| 4 | -6 | (27,18) | Como pk < 0  (xk+1, yk) = (28,18)  Pk+1 = pk + 2 ∆y = 0 |
| 5 | 0 | (28,18) |  |