# Content

[Content 0](#_Toc63696440)

[Previous examples 0](#_Toc63696441)

[Superposition principle of F 1](#_Toc63696442)

[Electrif field lines 1 charge 2](#_Toc63696443)

[Sigmoid plant height 2](#_Toc63696444)

[E field examples 2](#_Toc63696445)

[Line of charge front 3](#_Toc63696446)

[Line of charge back 3](#_Toc63696447)

[Line of charge x, y, z 4](#_Toc63696448)

[Line of charges 3-axes 4](#_Toc63696449)

[Tangent line 4](#_Toc63696450)

[Scanning method 5](#_Toc63696451)

[Bisection method 5](#_Toc63696452)

[Equation of a line 6](#_Toc63696453)

[Newton-Raphson derivation 6](#_Toc63696454)

[Unit vector 6](#_Toc63696455)

[Newton-raphson method 7](#_Toc63696456)

[Vector rxyθ 7](#_Toc63696457)

[Electric field at origin 7](#_Toc63696458)

[Becker glass scale 8](#_Toc63696459)

[Cartesian and polar cs 8](#_Toc63696460)

[Length and area of a circle 8](#_Toc63696461)

[Notes and version 9](#_Toc63696462)

# Previous examples

*x*

*y*

*z*



*x*

*y*

*z*

200

*Fy*

*t*

0.02

0.04

200

*Fx*

*t*

0.02

0.04

4



*x*med = *xm*

Start

*x*min, *x*max, *x*med

1

*j* ≤ *N*

*j* = *j* + 1

2

*i* = *i* + 1

N

Y

*θ*

*x*

*y*

*z*

*μs*, *uk*

*I*, *R*

*ω*, *α*

*v*, *a*

*qi*

*qj*

*Fij*

*qi*

*qj*

*Fij*

*qj*

*Ej*

*qj*

*Ej*

*x*

*y*

*z*

*qj*



*x*

*y*

*z*

*dqj*



*y*

*x* (μm)

1

*q*1

2

3

4

5

0

0

1

2

3

4

5

–

+

*q*2

*sy* (μm)

*x*

*y*

*z*

*sz* (μm)

*sx* (μm)

# Superposition principle of F

*q*1

*q*2

*q*3

(a)

(b)

(c)

(d)

*q*1

*q*2

*q*3



*q*1

*q*2

*q*3



*q*1

*q*2

*q*3



# Electrif field lines 1 charge

# Sigmoid plant height

 << === 

# E field examples

# Line of charge front

*x*

*y*

*z*

*x* = *b*

*x* = *a*

*L*

*dqj*

*x* = *b* + *l*

*l*



*λ*



*l*

*λ*, *L*



*o*

*o*

# Line of charge back

*x*

*y*

*z*

*x* = *b*

*x* = *a*

*L*

*dqj*

*x* = *a* – *l*

*l*



*λ*



*l*

*λ*, *L*



*o*

*o*



# Line of charge x, y, z

*x*

*y*

*z*

*l*1+

*λ*1, *L*1



*o*1*+*

*l*1-



*o*1-

*y*

*z*

*x*

*l*2+

*λ*2, *L*2



*o*2*+*

*l*2-



*o*2-

*z*

*x*

*y*

*l*3+

*λ*3, *L*3



*o*3*+*

*l*3-



*o*3-

# Line of charges 3-axes

*x*

*y*

*z*

*o*

*l*1

*λ*1, *L*1

*λ*2, *L*2

*λ*3, *L*3

*l*2

*l*3



# Tangent line

*y*

*x*

*x*1

*f*(*x*1)

*f*(*x*)

*y* = *mx* +*n*

*x*1 – Δ*x*

*f*(*x*1) – Δ*y*



# Scanning method

4

End

3

Y

Start

*f*(*x*), *x*beg, *x*end, Δ*x*

2

*x* = *x*beg

*S*0*S* < 0

*S*0 = *f*(*x*)

*x* = *x* + Δ*x*

*S* = *f*(*x*)

1

2

1

*x* < *x*end

N

N

3

*x*root ∉ [*x*beg, *x*end]

4

*x*root = *x* – ½Δ*x*

*xroot*

# Bisection method

Y

Start

*f*(*x*), *x*beg, *x*end, *ε*

*n* = 1

*xn* = *x*beg

N

*xn*+1 = *x*end

*xn*+2 = ½(*xn*+1+*xn*)

2

2

*c* < 0

*fn*+1 = *f*(*xn*+1)

*fn*+2 = *f*(*xn*+2)

*c* = *fn*+1 *fn*+2

*xn*+1 *xn*

3

3

1

*f*root < ε

*f*root = |*f*(*xn*+2)|

1

N

*x*root

*x*root = *xn*+2

End

*n* = *n* + 1

Y

# Equation of a line

*y*

*x*

*x*1 + Δ*x*

*y*1 + Δ*y*

*y* = *mx* +*n*

*x*1

*y*1

*n*

0

0

*θ*

# Newton-Raphson derivation

*y*

*x*

*x*1

*x*2

*x*4

*x*∞

*x*3

*f*(*x*)

*m*1 *=f* '(*x*1)

*m*2 *=f* '(*x*2)

*m*3 *=f* '(*x*3)

# Unit vector

*y*

*x* (μm)

1

2

3

4

5

0

0

1

2

3

4

5

9

10

6

7

8



*x*

*y*

*z*

# Newton-raphson method

Start

*f*(*x*), *f* '(*x*) *x*1, *ε*

*n* = 1



2

1

*c* < ε

*c* = | *f*(*xn*+1)|

2

1

*n* = *n* + 1

N

*x*root *= xn*+1

*x*root

End

Y

# Vector rxyθ

*y*

*x* (μm)

1

2

3

4

5

0

0

1

2

3

4

6

9

10

6

7

8

5

*θ*

*r* = 10

*y* = 6

*x* = 8



# Electric field at origin

*x*

*y*

*z*

*qj*



*x*

*y*

*z*

*qj*



# Becker glass scale

*y*0

*y*1

*y*2

*y*3

*y*14

*V*

*V*

*V*

*V*

*V*

*V*

*V*

# Cartesian and polar cs

*y*

*x*

0



*x*

*y*

(*x*, *y*)

*x*

0



(*r*, *θ*)

*θ*

*r*

# Length and area of a circle

*x*

0

*dθ*

*r*

*r*

*rdθ*

*dr*

*x*

0

*rdθ*

*dr*





# Area of annulus

*x*

0

*θ*1

*dr*



*R*1

*R*2

*θ*2

# Notes and version

* 130% (Jekyll + MathJax), save as 0000x first then save as back to 0000, remove 0000x then, x = i
* 20210125