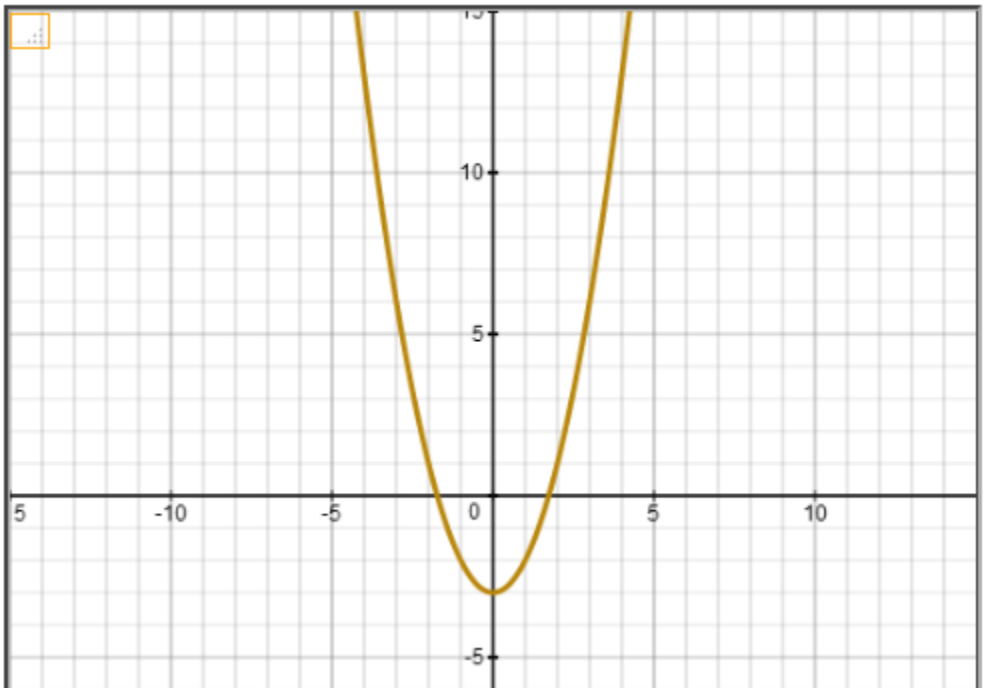
Example 1: Find the $x-$intercept(s) for $f(x)=x^2-3$



Iteration 1

Initial guess of zero = -3

x = -3 (guess of zero)

y = f(x) = f(-3) = 6

f'(x) = f'(-3) = -6

$$\frac{f(x)}{f'(x)} = -1$$

$$x - \frac{f(x)}{f'(x)} = -2$$

Summary for current iteration:

Guess of Zero of f(x)= -3

New Estimate of Zero of f(x) = -2

|New Estimate - Previous Estimate| = 1

Iteration 2

x = -2 (guess of zero)

y = $f(x) = f(-2) = 1$

$f'(x) = f'(-2) = -4$

$\frac{f(x)}{f'(x)} = -0.25$

$x - \frac{f(x)}{f'(x)} = -1.75$ (x-intercept of tangent line)

Summary for current iteration:

Guess of Zero of $f(x) = -2$

New Estimate of Zero of $f(x) = -1.$

|New Estimate - Previous Estimate| = 0.25

Iteration 3

x = -1.75 (guess of zero)

y = $f(x) = f(-1.75) = 0.0625$

$f'(x) = f'(-1.75) = -3.5$

$\frac{f(x)}{f'(x)} = -0.017857142857142856$

$x - \frac{f(x)}{f'(x)} = -1.7321428571428572$ (x-intercept of tangent line)

Summary for current iteration:

Guess of Zero of $f(x) = -1.75$

New Estimate of Zero of $f(x) = -1.7321428571428572$

|New Estimate - Previous Estimate| = 0.017857142857142856

Iteration 4

x = -1.7321428571428572 (guess of zero)

y = $f(x) = f(-1.7321428571428572) = 0.00031887755102077975$

$f'(x) = f'(-1.7321428571428572) = -3.4642857142857144$

$\frac{f(x)}{f'(x)}$ = -0.00009204712812970961

x - $\frac{f(x)}{f'(x)}$ = -1.7320508100147276

Summary for current iteration:
Guess of Zero of $f(x)$= -1.7321428571428572
New Estimate of Zero of $f(x)$ = -1.7320508100147276
|New Estimate - Previous Estimate| = 0.00009204712812970961

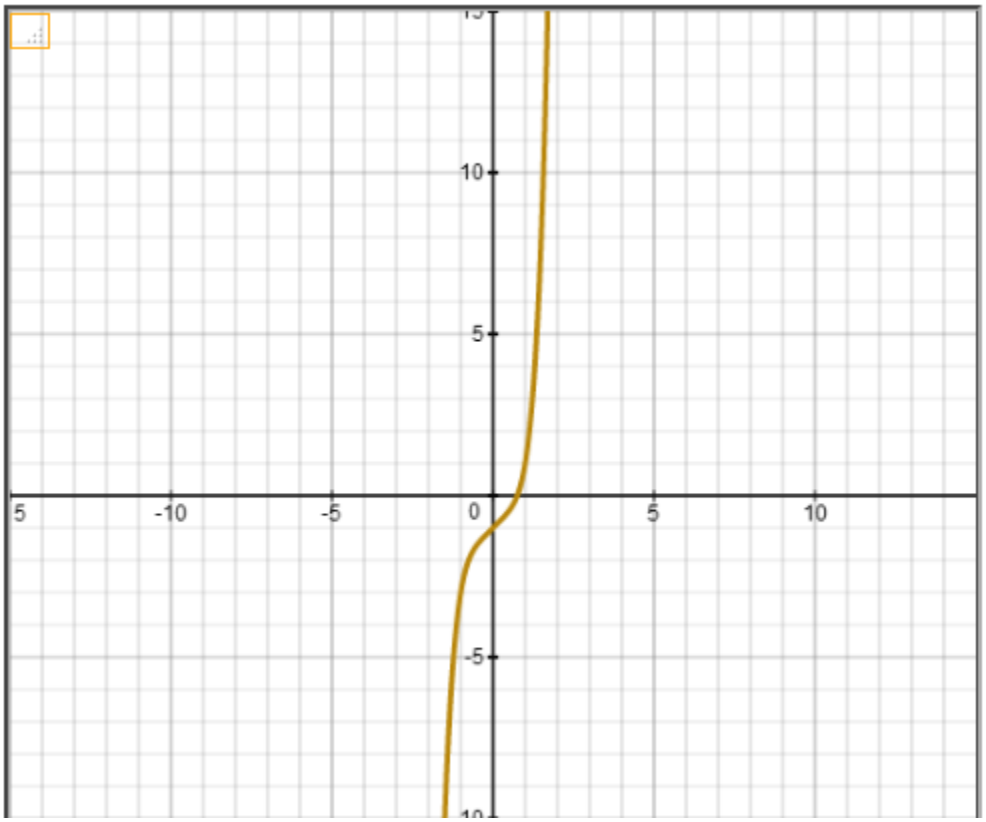
Iteration 5
x = -1.7320508100147276 (guess of zero)
y = $f(x)$ = f(-1.7320508100147276) = 0.000000008472674117854 24
$f'(x)$ = f'(-1.7320508100147276) = -3.464101620029455
$\frac{f(x)}{f'(x)}$ = -0.000000024458503378957 45

x - $\frac{f(x)}{f'(x)}$ = -1.7320508075688772

Summary for current iteration:
Guess of Zero of $f(x)$= -1.7320508100147276
New Estimate of Zero of $f(x)$ = -1.7320508075688772
|New Estimate - Previous Estimate| = 0.000000002445850337895745

Answer: x-intercept = -1.7320508075688772

Example 2: Find the $x-$intercept(s) for $f(x) = x^5 + x - 1$



$$f'(x) = 5x^4 + 1$$

Initial guess of zero of function = 0.1

Iteration 1

x = 0.1 (guess of zero)

y = f(x) = f(0.1) = -0.89999

f'(x) = f'(0.1) = 1.0005

$$\frac{f(x)}{f'(x)} = -0.8995402298850574$$

$$x - \frac{f(x)}{f'(x)} = 0.9995402298850574$$

Summary for current iteration:

Guess of Zero of f(x)= 0.1

New Estimate of Zero of f(x) = 0.9995402298850574

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.8995402298850574

Iteration 2

x = 0.9995402298850574 (guess of zero)

y = $f(x) = f(0.9995402298850574) = 0.9972434922242523$

$f'(x) = f'(0.9995402298850574) = 5.990810937414326$

$$\frac{f(x)}{f'(x)} = 0.16646218728021975$$

$$x - \frac{f(x)}{f'(x)} = 0.8330780426048376$$

Summary for current iteration:

Guess of Zero of $f(x)$= 0.9995402298850574

New Estimate of Zero of $f(x)$ = 0.8330780426048376

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.16646218728021975

Iteration 3

x = 0.8330780426048376 (guess of zero)

y = $f(x) = f(0.8330780426048376) = 0.23434041795764182$

$f'(x) = f'(0.8330780426048376) = 3.4083120357977017$

$$\frac{f(x)}{f'(x)} = 0.06875556448363608$$

$$x - \frac{f(x)}{f'(x)} = 0.7643224781212016$$

Summary for current iteration:

Guess of Zero of $f(x)$= 0.8330780426048376

New Estimate of Zero of $f(x)$ = 0.7643224781212016

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.06875556448363608

Iteration 4

x = 0.7643224781212016 (guess of zero)

y = $f(x) = f(0.7643224781212016) = 0.025167864786022953$

$f'(x) = f'(0.7643224781212016) = 2.7063830656008667$

$\frac{f(x)}{f'(x)} = 0.009299446595685532$

$x - \frac{f(x)}{f'(x)} = 0.7550230315255161$

Summary for current iteration:

Guess of Zero of $f(x) = 0.7643224781212016$

New Estimate of Zero of $f(x) = 0.7550230315255161$

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.009299446595685532

Iteration 5

x = 0.7550230315255161 (guess of zero)

y = $f(x) = f(0.7550230315255161) = 0.00038146977562281137$

$f'(x) = f'(0.7550230315255161) = 2.6248407532308153$

$\frac{f(x)}{f'(x)} = 0.00014533063583124992$

$x - \frac{f(x)}{f'(x)} = 0.7548777008896849$

Summary for current iteration:

Guess of Zero of $f(x) = 0.7550230315255161$

New Estimate of Zero of $f(x) = 0.7548777008896849$

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.00014533063583124992

Iteration 6

x = 0.7548777008896849 (guess of zero)

y = $f(x) = f(0.7548777008896849) = 0.000000090888900543297 03$

$f'(x) = f'(0.7548777008896849) = 2.6235900842641384$

$\frac{f(x)}{f'(x)} = 0.000000034642990144728 63$

$x - \frac{f(x)}{f'(x)} = 0.7548776662466947$

Summary for current iteration:

Guess of Zero of $f(x)$= 0.7548777008896849

New Estimate of Zero of $f(x)$ = 0.7548776662466947

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.000000034642990144728 63

Iteration 7

x = 0.7548776662466947 (guess of zero)

y = $f(x) = f(0.7548776662466947) = .000000000000005107025913275 72$

$f'(x) = f'(0.7548776662466947) = 2.623589786223747$

$\frac{f(x)}{f'(x)} = 0.000000000000001946579431011 7728$

$x - \frac{f(x)}{f'(x)} = 0.7548776662466927$

Summary for current iteration:

Guess of Zero of $f(x)$= 0.7548776662466947

New Estimate of Zero of $f(x)$ = 0.7548776662466927

(this value is used as guess of zero in the next iteration.)

|New Estimate - Previous Estimate| = 0.000000000000001946579431011 7728

Answer: x-intercept = 0.7548776662466927