0.0.1 Initials

Function:
$$(-3.1416 + x)^2 + (-2.7183 + y)^2 + x^2 y \tag{1}$$

Gradient Vector:
$$\begin{bmatrix} 2(-3.1416 + x) + 2xy \\ 2(-2.7183 + y) + x^2 \end{bmatrix} \tag{2}$$

Hession Matrix:
$$\begin{bmatrix} 2 + 2y & 2x \\ 2x & 2 \end{bmatrix} \tag{3}$$

Start Value: (y =¿ 5.0, x =¿ -1.0) Function at point: 27.359035754102166

0.0.2 Iteration 1

Gradient at (y =¿ 5.0, x =¿ -1.0)
$$\begin{bmatrix} -18.283 \\ 5.5634 \end{bmatrix} \tag{4}$$

Hessian at (y =¿ 5.0, x =¿ -1.0)
$$\begin{bmatrix} 12 & -2 \\ -2 & 2 \end{bmatrix} \tag{5}$$

Inverse of Hessian
$$\begin{bmatrix} 0.1 & 0.1 \\ 0.1 & 0.6 \end{bmatrix} \tag{6}$$

(y =¿ 3.4902545279999995, x =¿ 0.2719745279999999) Function at point:
$$9.0888 \tag{7}$$

Diff of function values between two iterations:
$$18.27 \tag{8}$$

0.0.3 Iteration 2

Gradient at (y =¿ 3.4902545279999995, x =¿ 0.2719745279999999)
$$\begin{bmatrix} -3.8407 \\ 1.6179 \end{bmatrix} \tag{9}$$

Hessian at (y =¿ 3.4902545279999995, x =¿ 0.2719745279999999)
$$\begin{bmatrix} 8.9805 & 0.54395 \\ 0.54395 & 2 \end{bmatrix} \tag{10}$$

Inverse of Hessian
$$\begin{bmatrix} 0.11322 & -0.030792 \\ -0.030792 & 0.50837 \end{bmatrix} \tag{11}$$

(y =¿ 2.5494811205001673, x =¿ 0.7566295011282975) Function at point:
$$7.1761 \tag{12}$$

Diff of function values between two iterations:
$$1.9127 \tag{13}$$

0.0.4 Iteration 3

Gradient at (y =¿ 2.5494811205001673, x =¿ 0.7566295011282975)

$$\begin{bmatrix} -0.9119 \\ 0.23489 \end{bmatrix} \tag{14}$$

Hessian at (y =¿ 2.5494811205001673, x =¿ 0.7566295011282975)

$$\begin{bmatrix} 7.099 & 1.5133 \\ 1.5133 & 2 \end{bmatrix} \tag{15}$$

Inverse of Hessian

$$\begin{bmatrix} 0.16795 & -0.12708 \\ -0.12708 & 0.59615 \end{bmatrix} \tag{16}$$

(y =¿ 2.2935667718462867, x =¿ 0.9396373364802073) Function at point:

$$7.054 \tag{17}$$

Diff of function values between two iterations:
$$0.12207 \tag{18}$$

0.0.5 Iteration 4

Gradient at (y =¿ 2.2935667718462867, x =¿ 0.9396373364802073)

$$\begin{bmatrix} -0.093669 \\ 0.033492 \end{bmatrix} \tag{19}$$

Hessian at (y =¿ 2.2935667718462867, x =¿ 0.9396373364802073)

$$\begin{bmatrix} 6.5871 & 1.8793 \\ 1.8793 & 2 \end{bmatrix} \tag{20}$$

Inverse of Hessian

$$\begin{bmatrix} 0.20741 & -0.19489 \\ -0.19489 & 0.68313 \end{bmatrix} \tag{21}$$

(y =¿ 2.252432139556676, x =¿ 0.9655927742248082) Function at point:

$$7.0521 \tag{22}$$

Diff of function values between two iterations:
$$0.0019322 \tag{23}$$

0.0.6 Iteration 5

Gradient at (y =¿ 2.252432139556676, x =¿ 0.9655927742248082)

$$\begin{bmatrix} -0.0021353 \\ 0.00067368 \end{bmatrix} \tag{24}$$

Hessian at (y =¿ 2.252432139556676, x =¿ 0.9655927742248082)

$$\begin{bmatrix} 6.5049 & 1.9312 \\ 1.9312 & 2 \end{bmatrix} \tag{25}$$

Inverse of Hessian

$$\begin{bmatrix} 0.21551 & -0.2081 \\ -0.2081 & 0.70094 \end{bmatrix} \tag{26}$$

(y =¿ 2.251515574307129, x =¿ 0.9661931545204827) Function at point:

$$7.0521 \tag{27}$$

Diff of function values between two iterations:
$$9.5007 \cdot 10^{-7} \tag{28}$$