```
clear all; close all;
disp('=======================================');
disp('     GRADIENT by Finite Differences Assignment Q3     ');
disp('     AML 771: Design Optimization and Decision Theory   ');
disp('     Student: Debjit Hore       ');
disp('=======================================');

epsilon=0.01;
alpha=0;
X=[2, 1]'; D=[-1, 0]';
fAlpha= GETALPHA(alpha);
fAlphaEpsilon=GETALPHA(alpha+epsilon);
directionalDerivative= (fAlphaEpsilon-fAlpha)/epsilon;
disp(sprintf('The Directional Derivate of Given function through
 forward difference is %15.4E ',directionalDerivative));


disp('COMPARING WITH ANALYTICAL VALUE OF DIRECTIONAL DERIVATIVE');

[F0, gradientf]= GETFUN(X);
DD2= gradientf'*D;

disp(sprintf('The Directional Derivate calculated through analytical
 forumla is %15.4E ',DD2));
```

```
function[F0, gradientf]=GETFUN(X)
    syms x1 x2 ;
    f= 100*(x2-x1^2)^2+(1-x1)^2;
    gradf=gradient(f);
    x1=X(1); x2=X(2);
    gradientf= subs(gradf);
    F0= subs(f);
end
function [fAlpha]= GETALPHA(alpha)
    fAlpha= 100*(1-(2-alpha)^2)^2+(1-(2-alpha))^2;
end
```

```
=======================================
     GRADIENT by Finite Differences Assignment Q3
     AML 771: Design Optimization and Decision Theory
     Student: Debjit Hore
=======================================
The Directional Derivate of Given function through forward difference
 is     -2.3801E+03
COMPARING WITH ANALYTICAL VALUE OF DIRECTIONAL DERIVATIVE
```

```
The Directional Derivate calculated through analytical forumla is
 -2.4020E+03
```

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