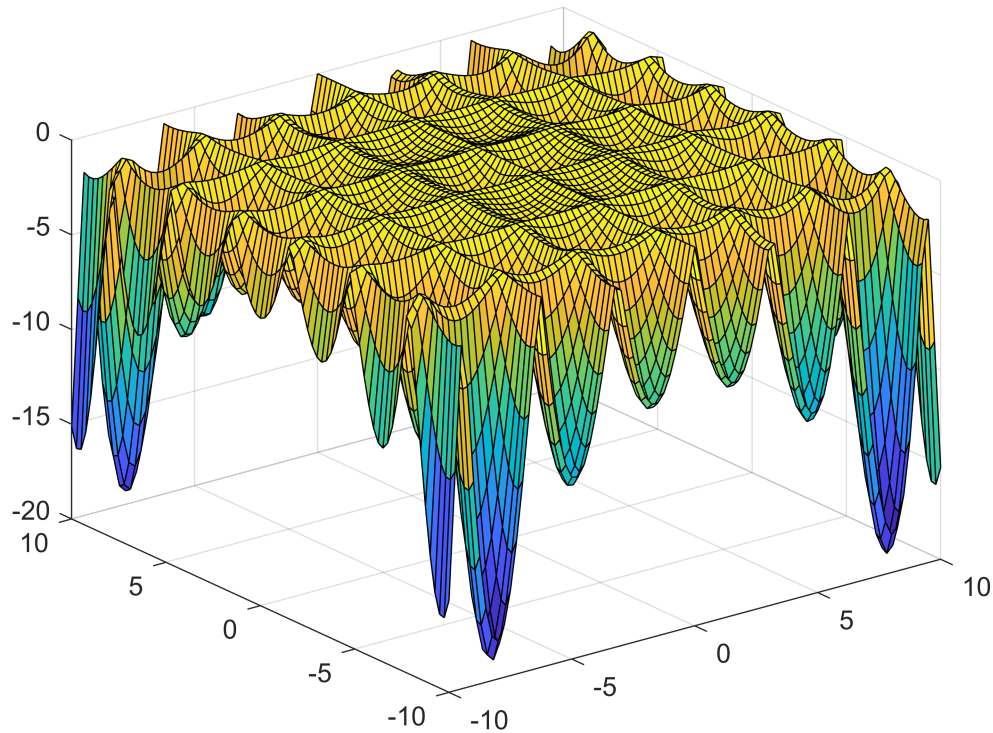
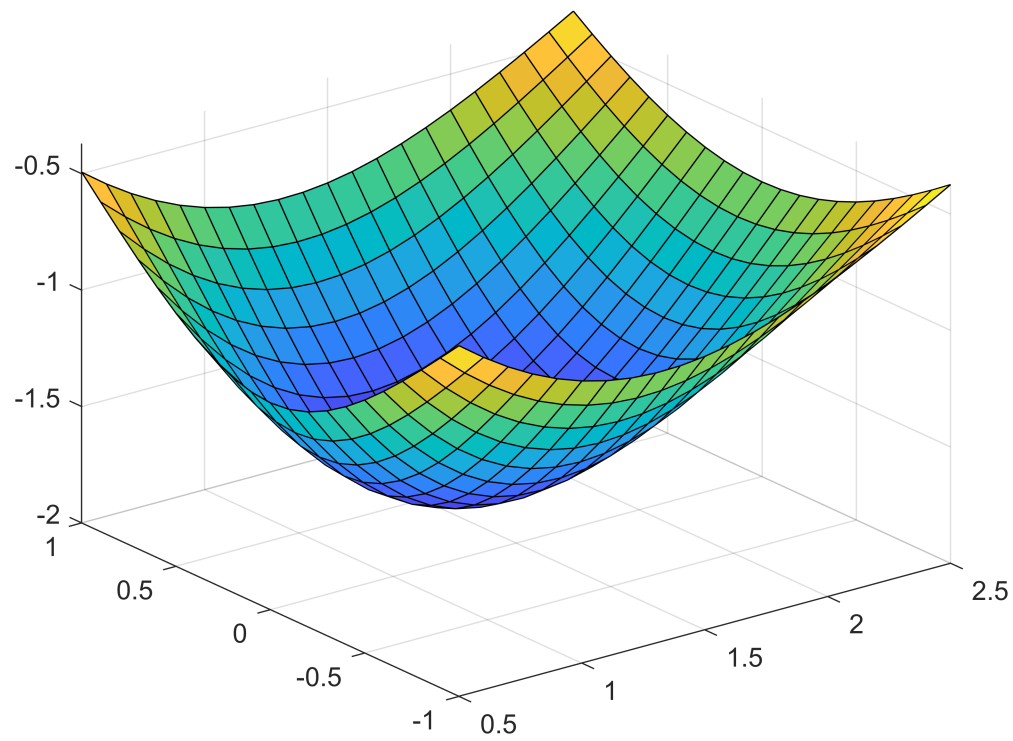


Problem 1

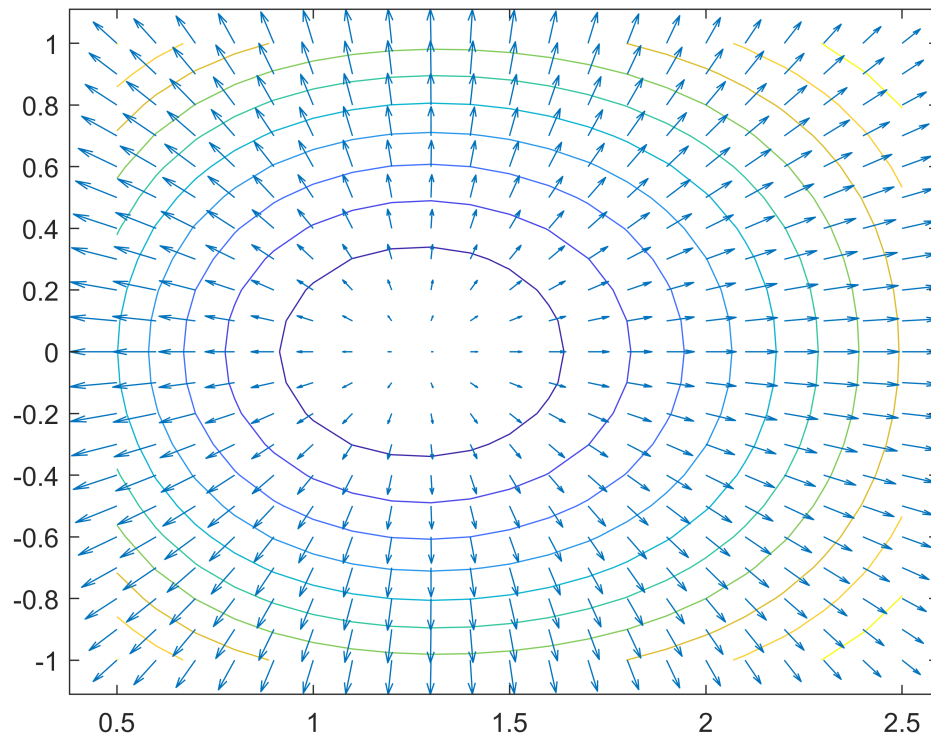
```
[x,y] = meshgrid( -10:0.25:10 , -10:0.25:10);  
f = (-1.*abs(sin(x).*cos(y)) ) .*exp(abs(1- ( sqrt(x.^2 + y.^2)) ./ pi)));  
surf(x,y,f);
```



```
[x1,y1] = meshgrid( 0.5:0.1:2.5 , -1:0.1:1);  
f1 = (-1.*abs(sin(x1).*cos(y1))) .*exp(abs(1- ( sqrt(x1.^2 + y1.^2)) ./ pi)));  
surf(x1,y1,f1);
```



```
[c,h] = contour (x1,y1,f1,10);  
[U,V] = gradient(f1,0.2,0.2);  
hold on  
quiver(x1,y1,U,V)  
hold off
```



Multiple Regression Code

```
function [a,b,c,d] = multipleRegression(xyz,w)

matrix = zeros(4,4);
product = zeros(4,1);

x = xyz(1,:);
y = xyz(2,:);
z = xyz(3,:);

matrix1 = [width(xyz) sum(x) sum(y) sum(z) ; sum(x) sum(x.^2) sum(x.*y) sum(x.*z); sum(y) sum(y.*x) sum(y.*y) sum(y.*z); sum(z) sum(z.*x) sum(z.*y) sum(z.*z)];

product(1,1) = sum(w);
product(2,1) = sum(w.*x);
product(3,1) = sum(w.*y);
```

```

product(4,1) = sum(w.*z);

abcd = matrix1 \ product ;
a = abcd(1,1);
b = abcd(2,1);
c = abcd(3,1);
d = abcd(4,1);

end

```

Polynomial Regression code

```

function [coeff, error] = polynomialRegression1(pts, m)

if m == 0
    x= pts(1,:);
    y= pts(2,:);
    matrix = [1 1 1 1]';
    C= [ y(1) y(2) y(3) y(4)]';

end

if m == 1
    x= pts(1,:);
    y= pts(2,:);
    matrix = [ 1 1 1 1 ; x(1) x(2) x(3) x(4)]';
    C= [ y(1) y(2) y(3) y(4)]';
end

if m==2;
    x= pts(1,:);
    y= pts(2,:);
    matrix = [ 1 1 1 1 ; x(1) x(2) x(3) x(4); (x(1))^2 (x(2))^2 (x(3))^2 (x(4))^2]';

    C= [ y(1) y(2) y(3) y(4)]';

end

if m==3;

    x= pts(1,:);
    y= pts(2,:);
    matrix = [ 1 1 1 1 ; x(1) x(2) x(3) x(4); (x(1))^2 (x(2))^2 (x(3))^2 (x(4))^2; (x(1))^3 (x(2))^3 (x(3))^3 (x(4))^3]';
    C= [ y(1) y(2) y(3) y(4)]';

end

coeff = matrix \ C

if m==0;

```

```

    y= pts(2,:);
    error = sum((coeff - y).^2)
end

if m==1;

    y= pts(2,:);
    error = sum((coeff(1)+coeff(2).*x - y).^2)
end

if m==2;

    y= pts(2,:);
    error = sum((coeff(1)+coeff(2).*x + coeff(3).*x.^2 - y).^2)
end

if m==3;

    y= pts(2,:);
    error = sum((coeff(1)+coeff(2).*x + coeff(3).*(x.^2) + coeff(4).*(x.^3) - y).^2)
end

    %pts = [0.1 1 2 3; 0 1 2.1 4]

```