Part I Section 3 Functions

```
% Exercse 10 part 1
function out = kridgereg(K,y,gamma)
% preform kernel ridge regression as per Eq.12 (assignment handout)
% Input:
% K is the kernel matrix - should be square!
% y is a vector of the dependant variable
% gamma is the scalar ridge parameter
% Output:
% Out == alpha vector of dual weights

len = size(K,1);
    if len ~= size(K,2) % check if K is square
        disp('Kernel matrix shoudl be square')
    end

out = (K + gamma * len * eye(len)) \ y;
end

% Exercse 10 part 2
function out = dualcost(K,y,alpha)
% function calculates MSE on dual kernel ridge regression using Eq. 15
 from
% the assignmnet handout.
% Input:
% K is the kernel matrix - should be square!
% y is a vector of the dependant variable
% alpha is the vector of dual weights
% Output:
% Out - single value of the MSE

out = (K * alpha - y)' * (K * alpha - y) / size(K,1);
end

% Exercse 10 part 3
function Kk = MygaussKernel(x1,x2,v)
% Gaussian Ridge Regression Kernel
% function calculates gaussian kernel using Eq.11 from assignmnet
 handout
% Input:
% x1 training data (x1 and x2 should have same no of columns)
% x2 validation data
% sigma is the variance parameter of gaussian kernel
% Output:
% Kernel matrix

x = [x1; x2];

[a, ~] = size(x);

Kk = zeros(a,a);
```

```
for i=1:a
    for j=1:a
       Kk(i,j) = exp(-(norm(x(i,:)-x(j,:))^2)/(2*v^2));
    end
end
end
```

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