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Implement the weighted sum of objectives derived in part A

```
clear;
curve_smoothing;

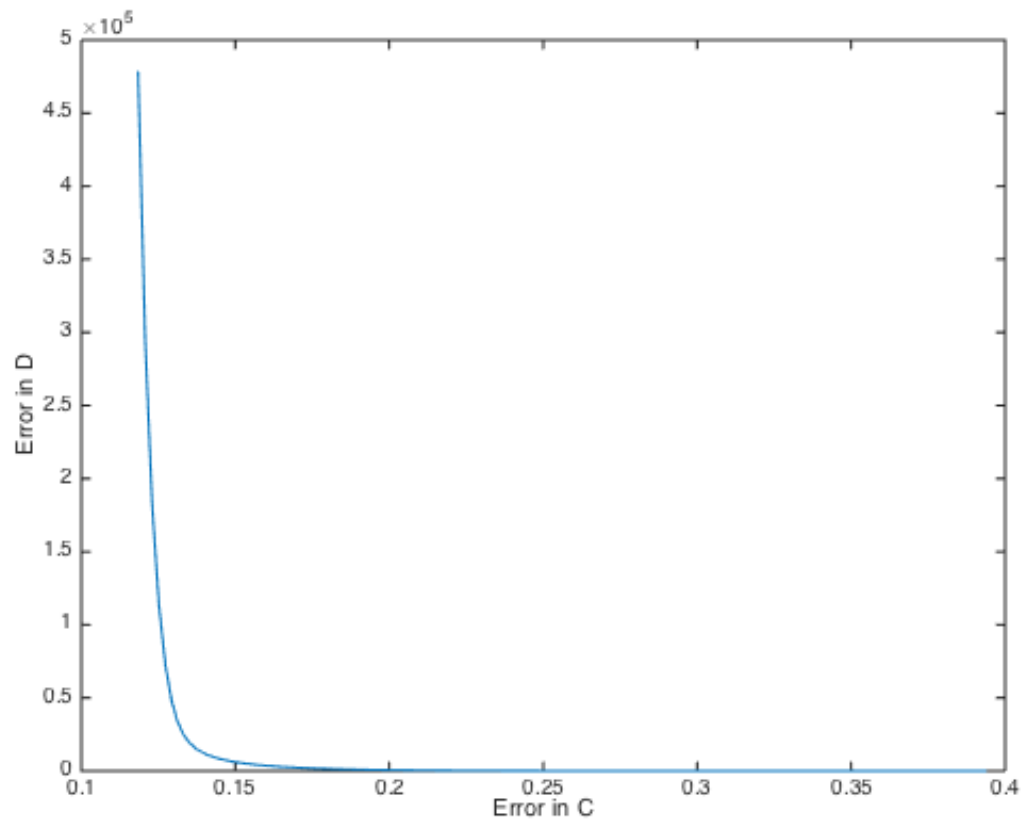
% Create A matrix
A = zeros(n-2, n);
for i = 2:n-1
    A(i-1, i-1:i+1) = [i^4 -2*i^4 i^4];
end

mu = logspace(-8, 2);
for i = 1:length(mu);
    Ap = [1/sqrt(n) * eye(n); sqrt(mu(i)/(n-2)) .* A];
    yp = [1/sqrt(n) * f; zeros(n-2,1)];

    ghat = (Ap'*Ap)\Ap'*yp;

    c(i) = 1/n*norm(f-ghat)^2;
    d(i) = 1/(n-2)*norm(A*ghat)^2;
end

plot(c, d);
xlabel('Error in C');
ylabel('Error in D');
```



For $\mu = 0$

```
mu = 0;
Ap = [1/sqrt(n) * eye(n); sqrt(mu/(n-2)) .* A];
yp = [1/sqrt(n) * f; zeros(n-2,1)];
g0 = (Ap'*Ap)\Ap'*yp;
c0 = 1/n*norm(f-ghat)^2;
d0 = 1/(n-2)*norm(A*ghat)^2;
```

For $\mu = \text{infinity}$

```
mu = 10000;
Ap = [1/sqrt(n) * eye(n); sqrt(mu/(n-2)) .* A];
yp = [1/sqrt(n) * f; zeros(n-2,1)];
ginf = (Ap'*Ap)\Ap'*yp;
cinf = 1/n*norm(f-ghat)^2;
dinf = 1/(n-2)*norm(A*ghat)^2;
```

For $G\#1$

```
mu = 0.0000000001;
Ap = [1/sqrt(n) * eye(n); sqrt(mu/(n-2)) .* A];
yp = [1/sqrt(n) * f; zeros(n-2,1)];
g1 = (Ap'*Ap)\Ap'*yp;
c1 = 1/n*norm(f-ghat)^2;
d1 = 1/(n-2)*norm(A*ghat)^2;
```

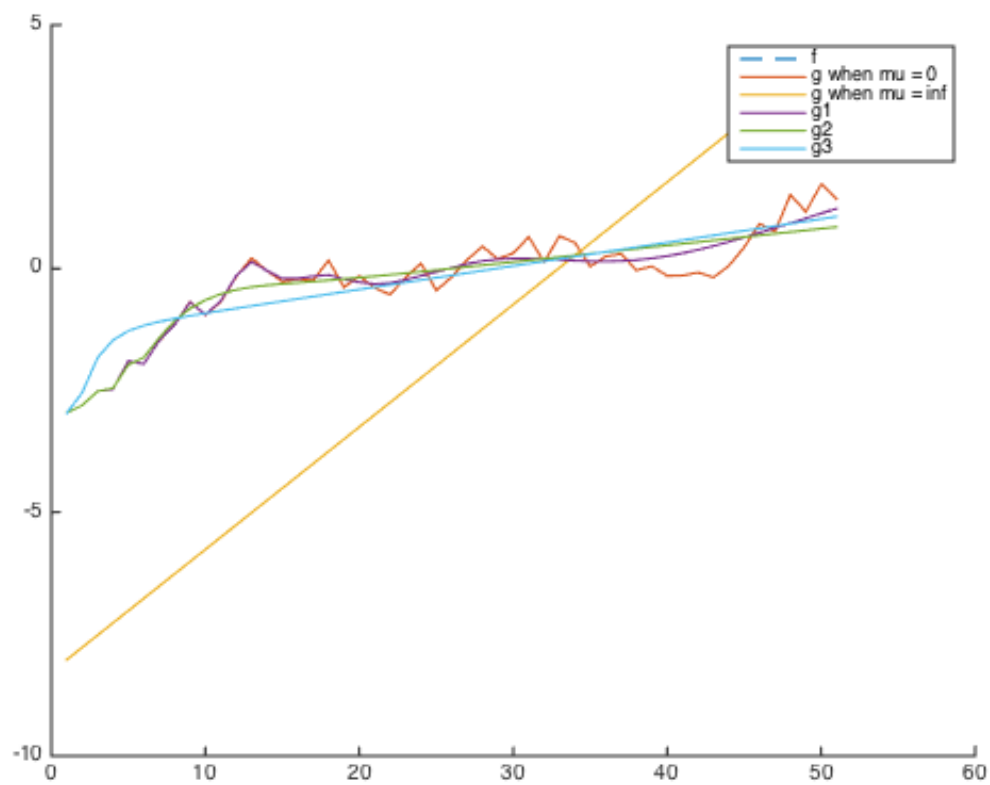
For G#2

```
mu = 0.0000001;  
Ap = [1/sqrt(n) * eye(n); sqrt(mu/(n-2)) .* A];  
yp = [1/sqrt(n) * f; zeros(n-2,1)];  
g2 = (Ap'*Ap)\Ap'*yp;  
c2 = 1/n*norm(f-ghat)^2;  
d2 = 1/(n-2)*norm(A*ghat)^2;
```

For G#3

```
mu = 0.0001;  
Ap = [1/sqrt(n) * eye(n); sqrt(mu/(n-2)) .* A];  
yp = [1/sqrt(n) * f; zeros(n-2,1)];  
g3 = (Ap'*Ap)\Ap'*yp;  
c3 = 1/n*norm(f-ghat)^2;  
d3 = 1/(n-2)*norm(A*ghat)^2;  
  
figure; hold;  
plot(1:n,f, '--');  
plot(1:n,g0);  
plot(1:n,ginf);  
plot(1:n,g1);  
plot(1:n,g2);  
plot(1:n,g3);  
legend('f', 'g when mu = 0', 'g when mu = inf', 'g1', 'g2', 'g3');
```

Current plot held



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