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Problem 2

```
clear all
close all
syms t
p1 = 1-t^2;
p2 = exp(-t);
y = -1 + t^2 ;
z = 2 + t + t^3;
%inner product should be 0 if y is in V and z is in Vperp
check_in_product = double(int(z*y,0,1));

q1 = simplify(expand(simplify(y/(int(y^2,0,1)^0.5))));
e2 = z - int(q1*z,0,1)/(int(q1^2,0,1)^0.5)*q1;
q2 = simplify(expand(simplify(e2/(int(e2^2,0,1)^0.5))));
check_in_product = double(int(q1*q2,0,1));
expand(simplify(expand(simplify(expand(q1+(249/(2*5810^(1/2))*q2))))));
```

Problem 3

```
clear all
close all
load mid1_p3_data.mat
D = [sin(10*t'), t'.^2, t', ones(length(t),1)];
f = inv(D'*D)*D'*x';
A = f(1)
a = f(2)
b = f(3)
c = f(4)
plot(t,x)
hold on
plot(t,D*f)
title('Problem 3')
legend('Original Data', 'Least Squares')
xlabel('t')
ylabel('x')
```

A =

9.8557

a =

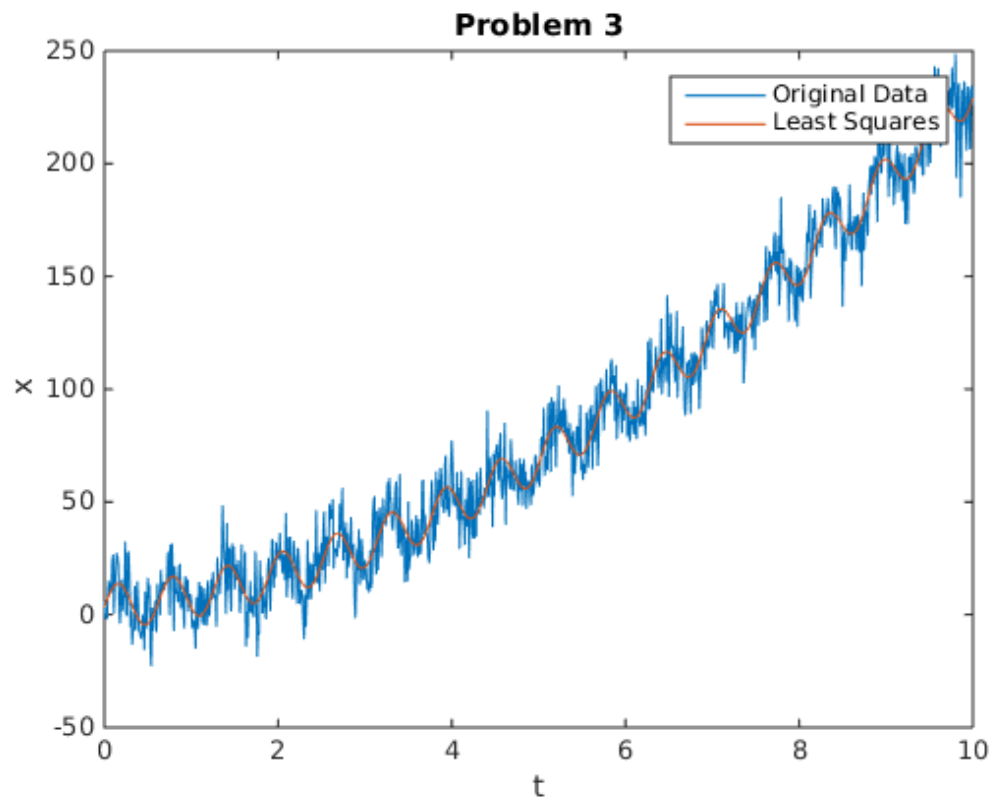
1.9914

$b =$

3.1567

$c =$

3.4535



Problem 4

```
clear all
close all
u = 4*[100; 100; 100; 100; 100; -100; -100; -100; -100; -100];
current_employees = 0;
x = 0;
for i = 1:10,
    current_employees = current_employees + u(i);
    x = x + 100*current_employees;
end
```

