```
format long

t = linspace(0, 1, 50);

% build the vandermonde A matrix with 10 columns
A = VanderMonde(cos(4*t), 10);

b = zeros(50, 1);
x = zeros(10, 1);

% build the vector b
for i = 1:50
    b(i) = cos(4 * t(i));
end

% (a) Formation and solution of the normal equations, using MATLAB s \
Ac = A' * A;
bc = A' * b;
L = chol(Ac, "lower");
y = L \ bc;
xa = L' \ y;

xa

% (b) QR factorization computed by mgs
[Q, R] = mgs(A);
xb = (lsp(b, Q, R))';

xb

% (c) QR factorization computed by house
[V, R] = house(A);
Q = formQ(V);
bh = Q' * b;
xc = R \ bh;

xc

% (d) x = A\b in MATLAB
xd = R \ (Q' * b);

xd
```

```
xa =

  -0.000000000000056
   0.999999999998957
   0.000000000001646
   0.000000000013290
  -0.000000000007876
  -0.000000000046570
   0.000000000012180
   0.000000000060982
  -0.000000000005922
  -0.000000000026745


xb =
```

```
  Columns 1 through 3

  -0.000000000000001   0.999999999999492   0.000000000000050

  Columns 4 through 6

   0.000000000006089  -0.000000000000319  -0.000000000020318

  Columns 7 through 9

   0.000000000000535   0.000000000025631  -0.000000000000265

  Column 10

  -0.000000000010922


xc =

  -0.000000000000000
   0.999999999999999
   0.000000000000001
   0.000000000000006
  -0.000000000000004
  -0.000000000000016
   0.000000000000003
   0.000000000000015
   0.000000000000000
  -0.000000000000004


xd =

  -0.000000000000000
   0.999999999999999
   0.000000000000001
   0.000000000000006
  -0.000000000000004
  -0.000000000000016
   0.000000000000003
   0.000000000000015
   0.000000000000000
  -0.000000000000004
```

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