Vandermonde polynomial interpolation over n points - Gregory Javens.

Input.

In[87]:=

```
f[x_] := -x^3 + 5 * x^2 - 3 * x - 3;
n = 4; (* <--  Specify number of interpolating points.*)
xCoords = Table[RandomReal[{-10, 10}], {i, 1, n}];
yCoords = Table[N[f[xCoords[[i]]]], {i, 1, n}] ;
(*x-coordinates on which you want to interpolate -
  Using a unit increment: x1=1, x2=2 etc.*)
points = Table[{xCoords[[i]], yCoords[[i]]}, {i, 1, n}];
(*points on the function that you interpolate over.*)
```

Output.

In[90]:=

```
vandermonde = Table[(xCoords[[i]])^j, {i, 1, n}, {j, 0, n}];
coeffs = LinearSolve[vandermonde, yCoords];
p[x_] := Table[coeffs[[i]], {i, 1, n + 1}].Table[x^(i-1), {i, 1, n + 1}]
Show[Plot[{f[x], p[x]}, {x, -5 * n, 5 * n}, PlotLegends → Automatic,
  PlotRange → All], ListPlot[points], PlotRange -> All]
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Out[93]=