Exercises 5.2

1.The strain in a 1D truss element is given by ε = ∂u/∂x. Mountthe corresponding matrix B in terms of nodal coordinates x1 and x2.

```
clear all
clc
```

```
syms x1 x2 xi
```

```
C = [x1; x2];
```

```
B = simplify(compute_B(C, xi))
```

B =

$$\left(\frac{1}{\overline{\overline{x_1}}-\overline{\overline{x_2}}} \quad -\frac{1}{\overline{\overline{x_1}}-\overline{\overline{x_2}}}\right)$$

```
function B = compute_B(C, xi)
nnodes = size(C, 1);
ndof = 1;
dN   = lin2_derivs(xi);
J    = C'*dN;
dNdX = dN*inv(J);
    for i = 1: nnodes
    c = (i-1) * ndof;
    B(1, c+1) = dNdX(i,1);
    end
end

function dN = lin2_derivs (xi)
n = [ 1/2 - xi/2
      1/2 + xi/2];
dN = [diff(n, xi)];
end
```