Exercises 4.4

5. Compute the Jacobian norm as function of ξ and η of the element in the last exercise changing the coordinates of node 3 to x3= (1,1,0).Later calculate the surface area by integration.

```
clear all
clc
```

```
syms xi eta
n = 2;
x = linspace (-1, 1, n);
```

```
C = [0 0 0; 1 0 0; 1 1 0; 0 1 1];
dn = quad4_deriv (xi, eta);
J = C' * dn;
```

```
NormJ = sqrt((det(J([1 2], [1 2])))^2 + ...
             (det(J([2 3], [1 2])))^2 + ...
             (det(J([3 1], [1 2])))^2);
int(int(NormJ, xi, -1, 1), eta, -1, 1);
var = vpa(ans)
```

```
var = 1.2807892752734039459001439351917
```

```
function dn = quad4_deriv (xi, eta)
n = [1.0/4.0 * (1 - xi) * (1 - eta)
     1.0/4.0 * (1 + xi) * (1 - eta)
     1.0/4.0 * (1 + xi) * (1 + eta)
     1.0/4.0 * (1 - xi) * (1 + eta)];
dn = [diff(n, xi), diff(n, eta)];
end
```