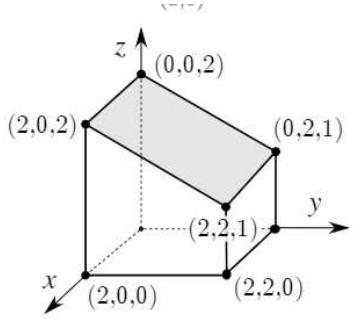
Exercises 5.6

5. For the element at right, determine the corresponding nodal forces if anormal tractiontn = 1kPa is applied in the shaded face.




```
clear all
clc
```

```
type = 8;
C = [0 0 2; 2 0 2; 2 2 1; 0 2 1];
tn = -1;
q = 4;
F = compute_F(type, C, tn, q);
vpa (F, 3)
```

```
ans =
```

$$\begin{pmatrix} 0 \\ -0.5 \\ -1.0 \\ 0 \\ -0.5 \\ -1.0 \\ 0 \\ -0.5 \\ -1.0 \\ 0 \\ -0.5 \\ -1.0 \end{pmatrix}$$

```
function F = compute_F(type,C, P, q)
if type == 8
    nnodes = 4;
else nnodes = 0;
end
ndof   = 3;
F      = zeros(ndof*nnodes,1);
for i = 1: q
    Q       = quadrature(q);
    xi      = Q (i, 1);
    eta     = Q (i, 2);
    w       = Q (i, 3);
    [dN, n] = quad_shape_form(nnodes,xi, eta);
```

```
    J       = C'*dN;
    N = zeros(nnodes*ndof,ndof);
    for j = 1: nnodes
    k = (j-1) * ndof;
    I = eye(3);
    N([k+1 k+2 k+3], :) = I*n(j);
    end
    tn = cross(J(:, 1),J(:, 2));
    jn = tn/norm(tn);
    F = F + N*P*jn*norm(J)*w;
end
end
```