Input File

This file generates the input for the main function and saves them in the .mat input file.

```
n_e = 64                % total number of elements
```

```
n_e = 64
```

```
n = sqrt(n_e);
p_e = 4                 % nodes per area element
```

```
p_e = 4
```

```
p_b = 2                 % nodes per boundary element
```

```
p_b = 2
```

```

n_n = (n+1)^2           % total number of nodes
```

```
n_n = 81
```

```
n_b = 2*n               % boundary nodes on C1
```

```
n_b = 16
```

```

C = zeros(n^2,p_e);      % Connectivity Matrix
C_b_4 = zeros(8,2);      % Boundary Connectivity (n = 16)
C_b_8 = zeros(16,2);     % Boundary Connectivity (n = 64)
Bu_4 = zeros(7,3);       % Essential BC (n=16)
Bu_8 = zeros(15,3);      % Essential BC (n=64)

for i = 1:n
    for j = 1:n
        C(j + (i-1)*n,1) = j + (i-1)*(n+1);
        C(j + (i-1)*n,2) = j + (i-1)*(n+1) + 1;
        C(j + (i-1)*n,3) = j + (i-1)*(n+1) + n+2;
        C(j + (i-1)*n,4) = j + (i-1)*(n+1) + n+1;
    end
end
C
```

```
C = 64×4
     1     2    11    10
     2     3    12    11
     3     4    13    12
     4     5    14    13
     5     6    15    14
     6     7    16    15
     7     8    17    16
     8     9    18    17
    10    11    20    19
    11    12    21    20
     ⋮
```

```
C_b_4 = [11 6;
    6 1;
    1 2;
    2 3;
    3 4;
    4 5;
    5 10;
    10 15];

C_b_8 = [37 28;
    28 19;
    19 10;
    10 1;
    1 2;
    2 3;
    3 4;
    4 5;
    5 6;
    6 7;
    7 8;
    8 9;
    9 18;
    18 27;
    27 36;
    36 45];

Bu_4 = [16 0 0;
    21 0 0;
    22 0 0;
    23 0 0;
    24 0 0;
    25 0 0;
    20 0 0;];

Bu_8 = [46 0 0;
    55 0 0;
    64 0 0;
    73 0 0;
    74 0 0;
    75 0 0;
    76 0 0;
    77 0 0;
    78 0 0;
    79 0 0;
    80 0 0;
    81 0 0;
    72 0 0;
    63 0 0;
    54 0 0;];
```

```
Bu = Bu_8
```

```
Bu = 15×3
    46     0     0
    55     0     0
    64     0     0
    73     0     0
    74     0     0
    75     0     0
    76     0     0
    77     0     0
    78     0     0
    79     0     0
     ⋮
```

```
C_b = C_b_8
```

```
C_b = 16×2
    37    28
    28    19
    19    10
    10     1
     1     2
     2     3
     3     4
     4     5
     5     6
     6     7
     ⋮
```

```
le = 2/n           % lenght of element
```

```
le = 0.2500
```

```
lb = 2/n           % lenght of boundary element
```

```
lb = 0.2500
```

```
X = zeros(n_n,2);    % Global coordinate vector

for i = 1:n_n

    f = floor(i/(n+1.1));
    r = rem(i,n+1);

    if (r==0)
        r = n+1;
    end

    X(i,2) = f*(2/n);
    X(i,1) = (r-1)*(2/n);

end
X
```

```
X = 81×2
         0         0
    0.2500         0
    0.5000         0
    0.7500         0
    1.0000         0
    1.2500         0
    1.5000         0
    1.7500         0
    2.0000         0
         0    0.2500
      ⋮
```

```
t_star_x = 500;
t_star_y = t_star_x^2;

t_star = [t_star_x;t_star_y]   % tranction vector
```

```
t_star = 2×1
         500
      250000
```

```
E = 2.1e11; % Young's Modulus in Pa
v = 0.3;    % Poisson's Ratio

S = (E/((1+v)*(1-2*v)))*[1-v v 0;v 1-v 0; 0 0 (1-2*v)/2] % S is the material stiffness matrix from constitutive law
```

S = 3×3

10^{11} ×

```
    2.8269    1.2115         0
    1.2115    2.8269         0
         0         0    0.8077
```

```
save("input_file2.mat");
```