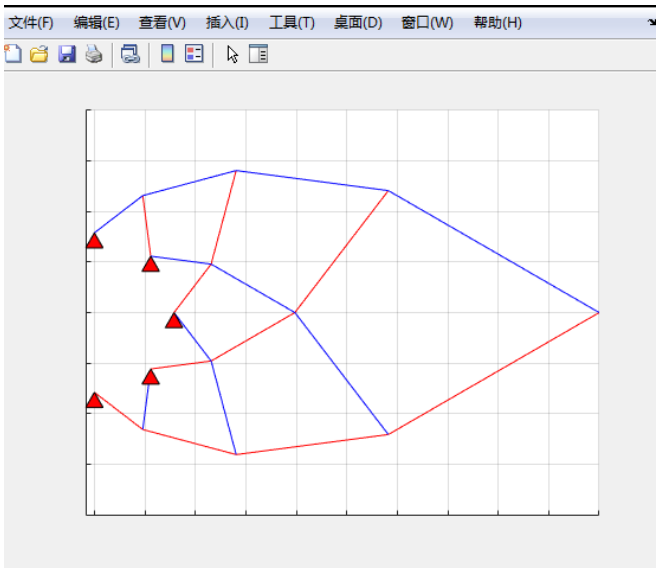
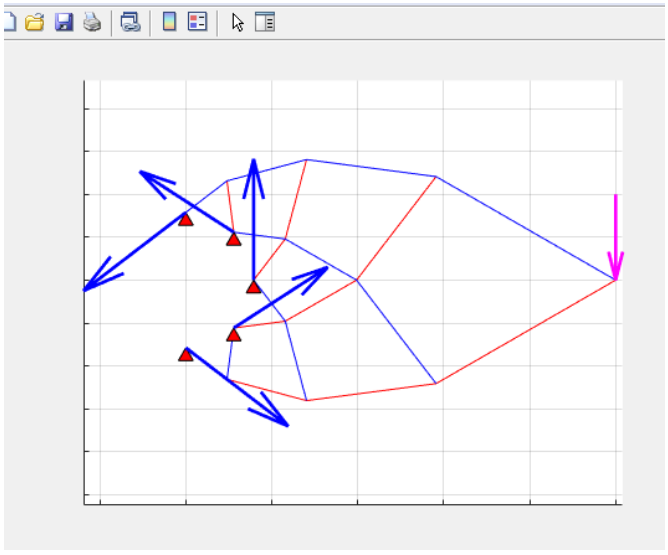
For the MitchelTruss4:

$\hat{m} = \hat{n} = r = 20$



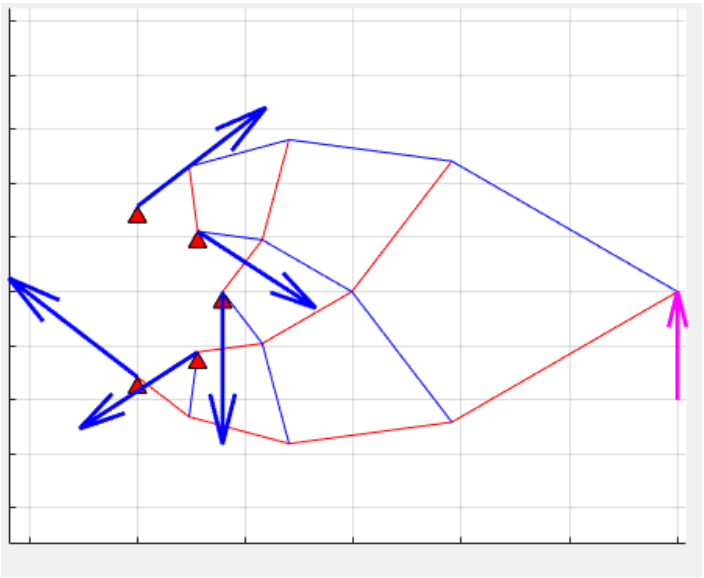
So it is not potentially inconsistent or underdetermined. It is static determined which means there is exactly one solution no matter what the applied force is.

Now we try to apply some force on this system. We can see that all bars are under compression and all strings are under tension.



```
c_bars =

    1.5004    1.0000    1.1448    1.3106    1.0262    0.4419    0.7011    0.8890    0.5059    0.5791

No bars under tension.  Good.

t_strings =

    1.5004    1.0000    1.1448    1.3106    1.0262    0.4419    0.7011    0.8890    0.5059    0.5791

The 10 strings are all under tension with tau_min=0.44188. Good.

Ase is not underdetermined (thus, it is not tensionable). The above solution is unique.
```

If we try a force in opposite direction:



```
least squares solution (i.e., NO pretensioning):

c_bars =

   -1.5004   -1.0000   -1.1448   -1.3106   -1.0262   -0.4419   -0.7011   -0.8890   -0.5059   -0.5791

Note: some bars not under compression.  Maybe replace them with strings?

t_strings =

   -1.5004   -1.0000   -1.1448   -1.3106   -1.0262   -0.4419   -0.7011   -0.8890   -0.5059   -0.5791

Some strings not under tension. Needs different tensioning or external loads.

Ase is not underdetermined (thus, it is not tensionable). The above solution is unique.
```

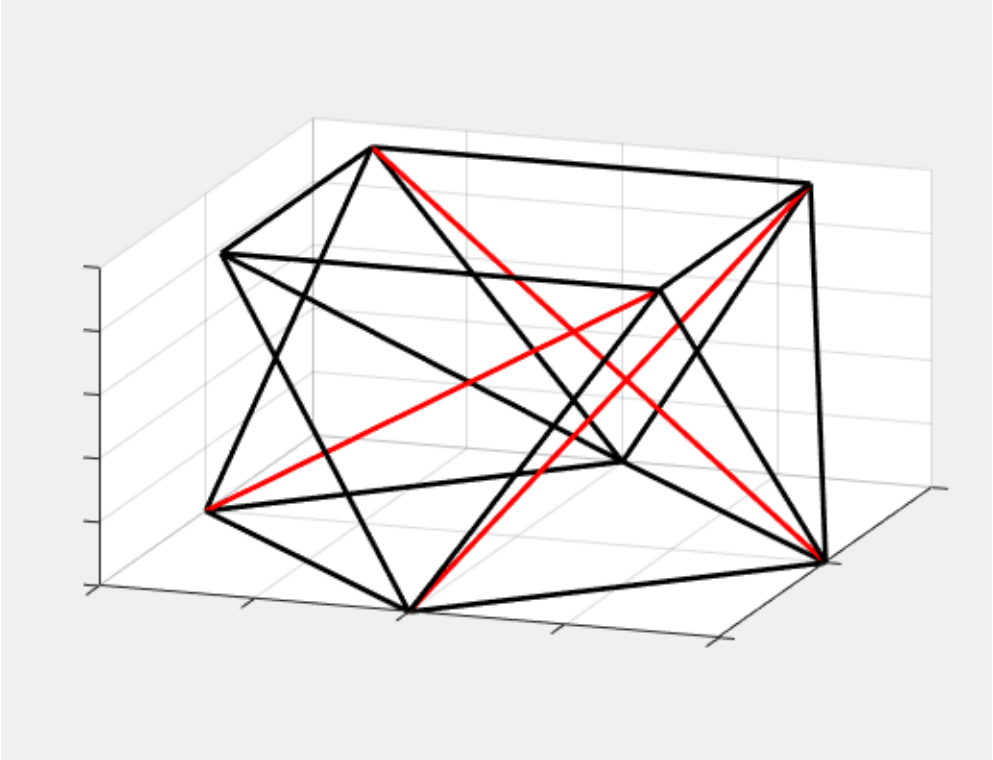
We can see that all bars are in tension and all strings are in compression. It is actually the same situation if we exchange the bars and strings.

For the NonminimalPrism4:

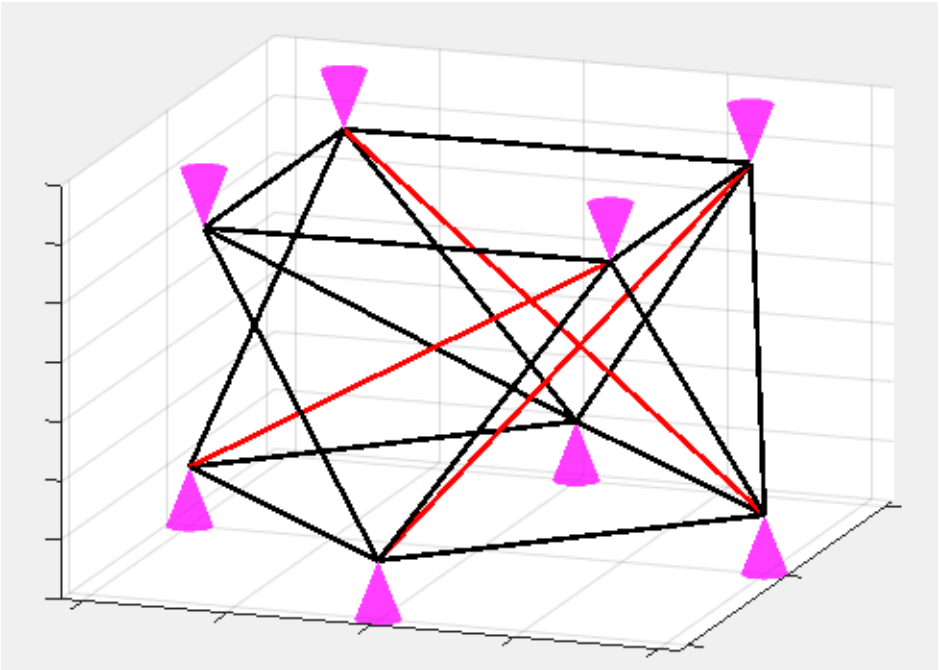
$\hat{m} = 24, \hat{n} = 20, r = 17$

Since $\hat{m} > r$, so it is potentially inconsistent, which means it has soft modes or instability with 3 degree of freedom.

Since $\hat{n} > r$, so it is underdetermined. So it has 0 or infinite solutions depending on applied force.



If we compress this whole system(pushing down at top and pushing up at bottom), we can see that it is not pretensionable, all bars are in compression but some strings are not in tension.



```
Some strings not under tension. Needs different tensioning or external loads.

Ase is underdetermined with 3 DOF. Checking now to see if system is pretensionable,
with tension >= 0.1 in all tethers for zero applied load.

Not pretensionable!
Results with external forces u as specified and tensioned to maximize tau_min:

c_bars =

    1.0505    0.4209    1.0505    1.0505

No bars under tension.  Good.
```

if we apply the force in opposite direction, we can see that not all strings are in tension and some bars are in tension.

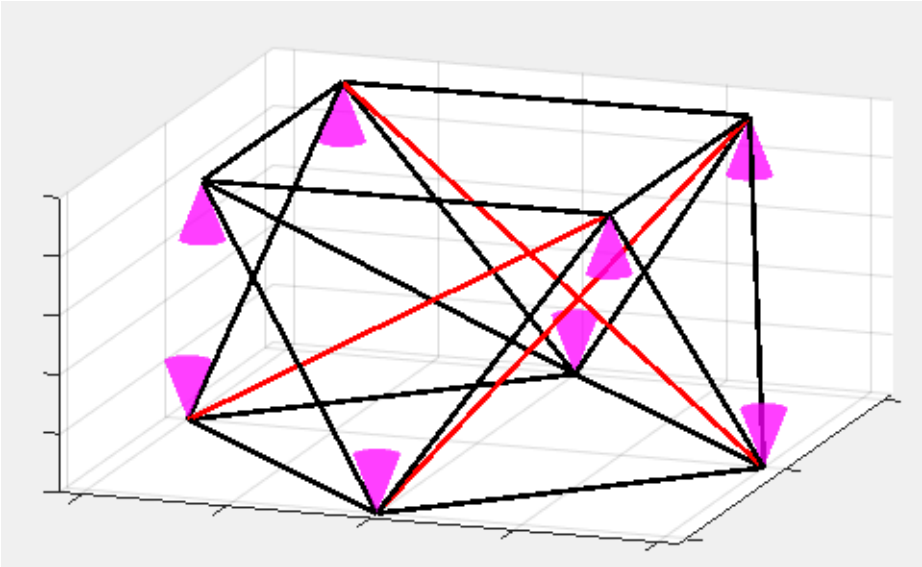
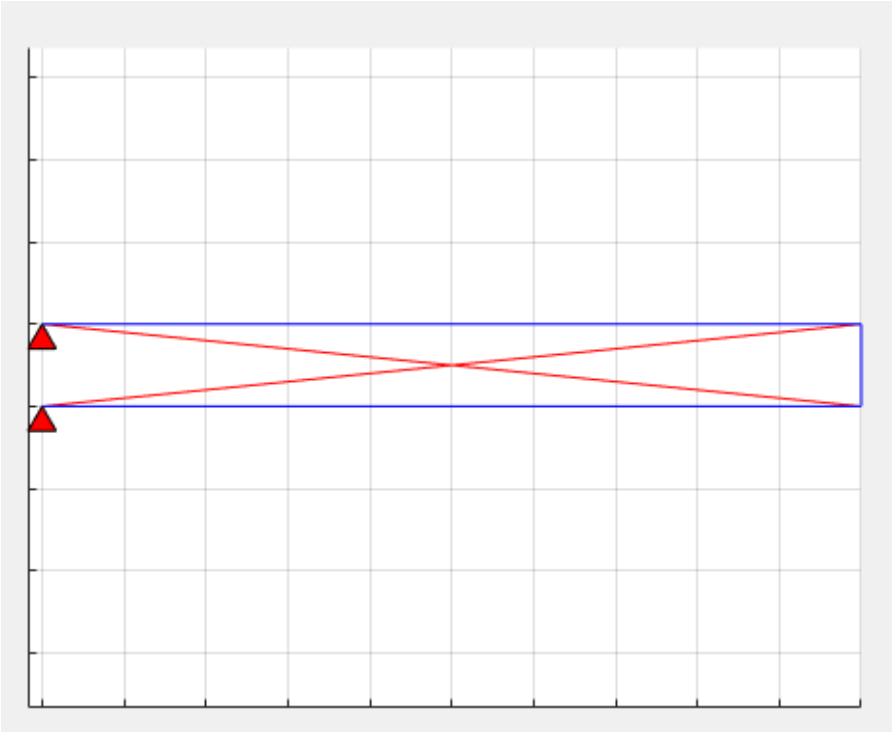


Figure 1.39 in bobs book:

This is a two bar system attached to a wall.

$\hat{m} = 4, \hat{n} = 5, r = 4$

So it is underdetermined with 1 DOF. And It is pretensionable.



When we applied some force we can see that all string are in tension and all bars are in compression.

```
c_bars =

   11.0549    1.0050

No bars under tension.  Good.

t_strings =

    0.1000   11.0000    1.0000

The 3 strings are all under tension with tau_min=0.1. Good.


c_bars =

   11.0549    1.0050


t_strings =

    0.1000   11.0000    1.0000
```