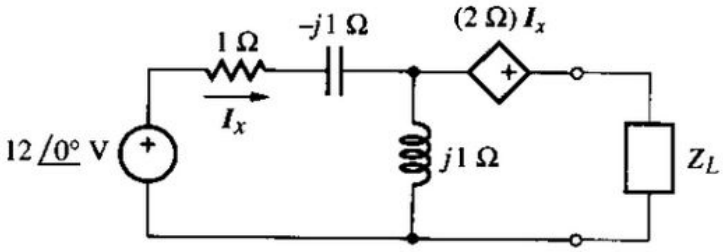
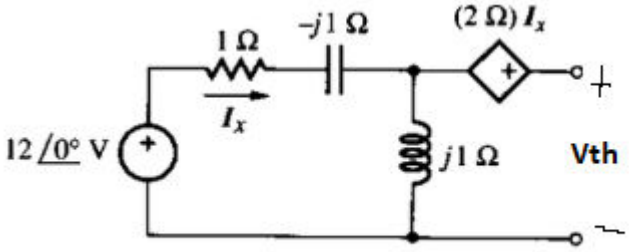
12.12 In the circuit of Figure P12.12 find the maximum average power that can be transferred to $\mathbf{Z}_L$ as well as $\mathbf{Z}_L$ itself.

12.13 Repeat Problem 12.12 for the circuit of Figure P12.13.



hallando voltaje de tyhevenin



Definimos las impedancias del circuito, sabiemos que en la fuente dependiente de corriente no vamos a tener correinte

```
clc, clear ,close all
format short g

vf = 12;

z1 = 1;
z2 = -j;
z3 = j;
z4 = 2;

zeq = z1+z2+z3
```

```
zeq =
     1
```

```
Ix = 12/zeq
```

```
Ix =
    12
```

conociendo la correinte Ix podemos saber la tension en la fuente depéndiente

```
v1 = Ix*z1
```

```
v1 =
    12
```

```
v2 = Ix*z2
```

```
v2 =
           0 -         12i
```

```
v3 = Ix*z3
```

```
v3 =
           0 +         12i
```

```
v4 = z4*Ix
```

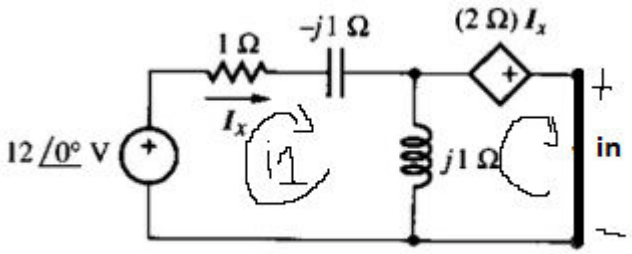
```
v4 =
    24
```

LkT

```
Vth = v4 + v3
```

```
Vth =
          24 +         12i
```

Corriente de norton




```
syms i1 i2

ec1= simplify(vf+(z1*i1)+(z2*i1)+z3*(i1-i2) == 0)
```

```
ec1 = 
```
$i_1 + 12 = i_2\,\mathrm{i}$

```
ec2 = simplify(-z3*(i2-i1)-z4*i2 == 0)
```

```
ec2 = 
```
$i_1\,\mathrm{i} = i_2\,(2+\mathrm{i})$

```
m = [(-z1-z2-z3) z3; -z3 (z3-z4)];
n = [vf;0];
h = m\n
```

```
h = 2×1 complex
         -18 -         6i
          -6 +         6i
```

```
In = h(2)
```

```
In =
           -6 +          6i
```

Ahora quetenos la tension thevenin y corriente de norton, puedo encontrar la z thevenin

```
zth = Vth/In
```

```
zth =
           -1 -          3i
```

luego sabemos que **la impedancia de carga** es igual a la conjugada de zth

```
zl = conj(zth) %[ohms]
```

```
zl =
           -1 +          3i
```

calculamos la **potencia maxima promedio**

```
pmax = (abs(Vth)^2)/(8*real(zth)) %[W]
```

```
pmax =
          -90
```