12.9 A source $v_s = 100\cos \pi 100t$ V with a series impedance of $60 + j80\ \Omega$ drives a 60-Ω load. (a) Find the average power absorbed by the load. (b) Specify a reactive element that, when connected in series with the load, will maximize its average power. Compare this power with that of part (a), and comment.

```
clc, clear, close all

vf = 100;
w = pi*100;
f = w/(2*pi);

zs = 60 + j*80;
r = 60;
```

a) calculamos la potencia activa

```
If = vf/(zs+r);
I_f = [abs(If)/sqrt(2) angle(If)*180/pi] %[A]
```

```
I_f = 1×2
      0.49029       -33.69
```

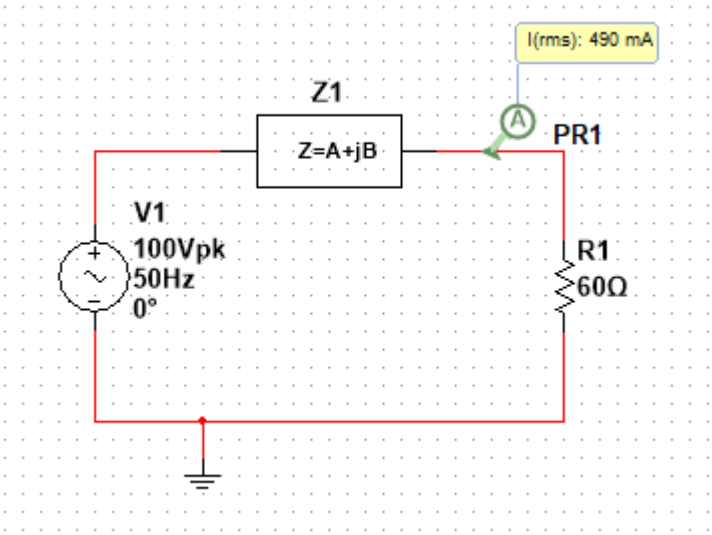
```
p = (vf/sqrt(2))*(abs(If)/sqrt(2))*cos(angle(If)) %potencia activa consumida por el circuito [W
```

```
p =
       28.846
```

```
pr = ((abs(If)/sqrt(2))^2)*r %potencia consumida por la carga [W]
```

```
pr =
       14.423
```

verificamos en el simulador



b)

tenemos una funete de tension en serie con una impedancia, para que haya maxima transferencia de potencia en la carga, esta debe ser igual al conjugado de la impedancia thevenin, o la que esta en serie con la funete:

```
z_load = conj(zs)
```

```
z_load =
          60 -         80i
```

```
If = vf/(zs+z_load)
```

```
If =
      0.83333
```

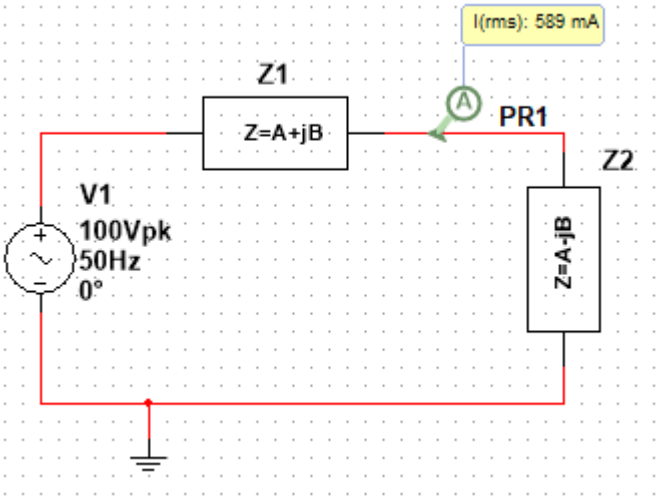
```
If_rms = If/sqrt(2)
```

```
If_rms =
      0.58926
```

```
pzl = real(((abs(If)/sqrt(2))^2)*z_load) %potencia consumida por la carga para este caso
```

```
pzl =
       20.833
```

verificamos en el simulador


I(rms): 589 mA
Z1
Z=A+jB
PR1
Z2
V1
100Vpk
50Hz
0°
Z=A-jB