12.3 (a) Find S, P, and pf for the circuit of Figure P12.3. Is pf leading or lagging? (b) Repeat, but with the capacitance removed from the circuit. Comment on your results.

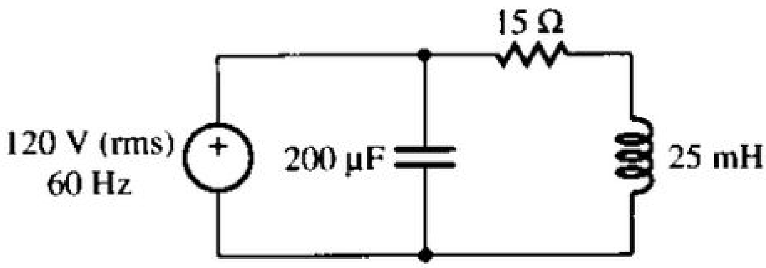


Figure P12.3

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

vf = 120; %[V]
f = 60; %[Hz]
w = 2*pi*f;
c = 200e-6; %[F]
l = 25e-3; %[H]
r = 15; %[ohms]
gr = 180/pi; %factor de conversion de rads a grados

zc = 1/(j*w*c);
zl = j*w*l;

zeq = 1/((1/(zc))+(1/(zl+r)));
z_eq = [abs(zeq) angle(zeq)*gr] %carga capacitiva
```

```
z_eq = 1×2
      15.175      -43.505
```

Con la impedancia equivalente podemos calcular la correinte rms entregada por la fuente:

```
i_f = vf/zeq;
i_fasor = [abs(i_f) angle(i_f)*gr] %[A]
```

```
i_fasor = 1×2
      7.9079       43.505
```

con tensiones y corrientes hallamos la potencia aparente, el factor de potencia y la potencia activa:

```
S = abs(vf)*abs(i_f) %[VA]
```

```
S =
      948.95
```

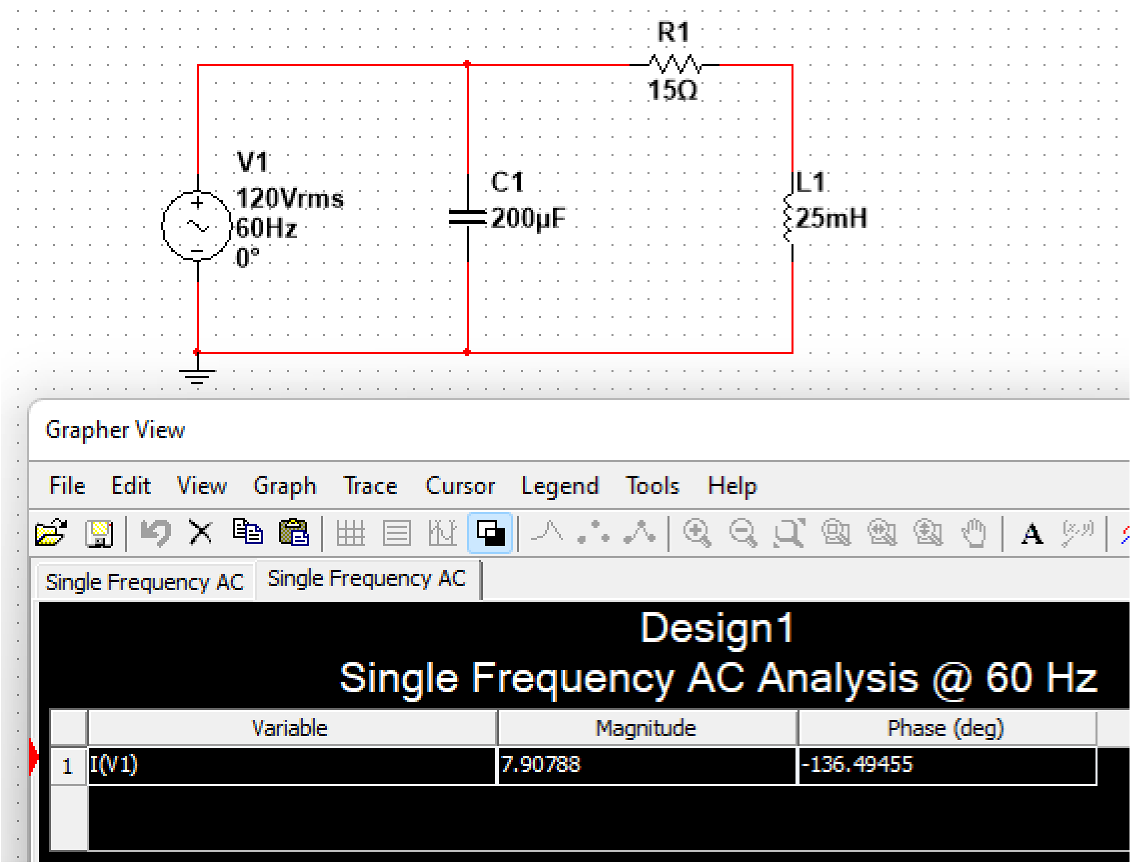
```
fp = cos(angle(i_f)) %en adelanto
```

```
fp =
      0.72531
```

```
P = S*fp %potencia activa consumida
```

```
P =
       688.28
```

lo verificamos en el simulador:



b) repetimos el ejercicio pero sin el capacitor

```
zeq = zl + r;
z_eq = [abs(zeq) angle(zeq)*gr] %angulo positivo = carga inductiva
```

```
z_eq = 1×2
       17.715       32.142
```

```
i_f = vf/zeq;
i_fasor = [abs(i_f) angle(i_f)*gr] %[A]
```

```
i_fasor = 1×2
       6.7739      -32.142
```

```
S = abs(vf)*abs(i_f) %[VA]
```

```
S =
      812.86
```

```
fp = cos(angle(i_f)) %en atraso
```

```
fp =
    0.84673
```

```
P = S*fp %potencia activa consumida
```

```
P =
      688.28
```

En este caso vemos que el factor de potencia aumenta sin el capacitor, lo verificamos en el simulador: