12.31 Two loads are in parallel and absorb a total of 5 kW at 120 V (rms), 60 Hz, and $pf = 0.8$, lagging. If Load 1 is known to absorb 2 kW at $pf = 0.7$, lagging, find (a) the power factor of Load 2 and (b) the parallel reactive element necessary to raise the combined power factor to 0.9, lagging.

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

vf = 120;
pt = 5e3;
pft = 0.8;

p1 = 2e3;
p2 = 3e3;

fp1 = 0.7;
```

calculamos la potencia reactiva de la carga 1:

```
q1 = p1*tan(acos(fp1)) %como es fp en atraso, sabemos que es una carga inductiva
```

```
q1 =
       2040.4
```

```
s1 = p1 + j*q1 %potencia compleja en la carga 1
```

```
s1 =
         2000 +     2040.4i
```

potencia compleja entregada por la fuente

```
qf = pt*tan(acos(pft))
```

```
qf =
         3750
```

```
sf = pt + j*qf %potencia compleja en la fuente
```

```
sf =
         5000 +       3750i
```

potencia compleja en la carga 2:

```
s2 = sf-s1
```

```
s2 =
         3000 +     1709.6i
```

factor de potencia en la carga 2:

```
fp2 = (real(s2)/abs(s2))
```

```
fp2 =
      0.86883
```

calculamos capacitancia para fp 1:

```
f = 60;
w = 2*pi*f;

xc = ((vf^2)/pt)/(tan(acos(0.9))-tan(acos(pft)));
c = -1/(w*xc)
```

```
c =
    0.0002447
```

```

```