EE331 Fall 2019 HW 1
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1

Q1: Find the phasor current I_S

```
v = {'S': 120}

z = {
    'M': 10 + 4j,
    'S': 0.2 + 0.5j,
    'L': 0.3 + 0.1j,
    'X': 3 + 10j
}

z['LM'] = z['L']+z['M']
z['LMX'] = (z['LM']**-1 + z['X']**-1)**-1
z['equivalent'] = z['LMX'] + z['S']

i = {'S': v['S']/z['equivalent']}
print("\(\\boxed{I_S =", f"{i['S']:.3}", "\si{A}}\)")
```

Python 3.7.4 (default, Jul 16 2019, 07:12:58) [GCC 9.1.0] on linux Type "help", "copyright", "credits" or "license" for more information. $\boxed{I_S = (11.9 - 14.2j)\text{A}}$ python.el: native completion setup loaded

Q2: Find the phasor voltage V_X

$$\frac{V_S - V_X}{Z_S} = I_S$$
$$\implies V_X = V_S - Z_S I_S$$

```
v['X'] = v['S'] - i['S']*z['S']
print("\(\\boxed{V_X =", f"{v['X']:.3}", "\si{V}}\)")
```

$\boxed{V_X = (111 - 3.12j)\text{V}}$

Q3: Find active power, reactive power, and apparent power flows at point X

```
p = {'X': v['X']*i['S']}
p['apparent'] = abs(p['X'])
p['active'] = p['X'].real
p['reactive'] = p['X'].imag
print(f"Active Power @ X = {p['active']:.5} W")
print(f"Reactive Power @ X = {p['reactive']:.5} W")
print(f"Apparent Power @ X = {p['apparent']:.5} W")
```

```
Active Power @ X = 1272.7 W
Reactive Power @ X = -1604.0 W
Apparent Power @ X = 2047.5 W
```

2

```
import numpy
import pint
unit = pint.UnitRegistry()

w = 60.0 * 2*numpy.pi * unit.rad/unit.s
v = {'S': 120 * unit.volts, 'L': 110*numpy.exp(1j * numpy.radians(5)) * unit.volts}
l = {'S': 0.1 * unit.mH, 'L': 0.2 * unit.mH}
r = {'S': 0.3 * unit.ohm, 'L': 0.5 * unit.ohm}
```

Q1: Find the phasor current I_S

```
print(w)
```

3

4