Extra Problems for Three Phase Power to be worked on Wednesday

1. A balanced three phase system with a y-connected source supplies three loads. The line voltage is 480 Vrms.

Load 1: Absorbs $S_1 = 88$ kVA at $PF_1=0.9$ lagging
Load 2: Absorbs $S_2 = 24$ kVA at $PF_2=0.7$ leading
Load 3: Absorbs $P_3 = 18$ kW at a unity PF

a) What are the line currents?
b) What is the phase current seen by each load?
c) What is the y-configuration of each load?
d) What is the total 3-phase complex power delivered by the source?
e) What is the power factor of the combined loads?

2. A balanced three phase system with a y-connected source supplies two loads. $|V_{an}| = 120$ V rms.

Load 1: $Z_y = 150\angle75°$ Ω
Load 2: $Z_\Delta = 24\angle\text{-}10°$ Ω

a) What are the phasor line currents?
b) What is the line voltage?
c) What is the total 3-phase real power delivered by the source?
d) What is the power factor of the combined loads?
e) If a balanced three-phase load is added to the circuit to correct the power factor to 0.91 lagging, what will this load be in its delta form. The real power delivered by the source and the voltage $|V_{an}|$ may not change.
f) What is the new line current magnitude?