1. Textbook problem 13-6 Repeat Example 13-2 if it a Double-Line fault between phases b and c.

2. Textbook problem 13-7

   Repeat Example 13-2 if it a Double-Line fault between phases b and c with a fault impedance $\mathbf{Z_f} = 0.15 \angle 0^o$ pu .

3. Textbook problem 13-8 Repeat Example 13-2 if it a Double-Line fault to ground with phases b and c grounded.

4. Textbook problem 13-10

   Repeat Example 13-2 if it a single-line to ground fault on phase a of Bus-1.
   The generator neutral is grounded through a resistance $R_n := 0.10 \cdot pu$.

5. Textbook problem 13-11

   Repeat Example 13-2 if there is a line-line to ground fault involving phases b and c of Bus-1.
   The generator neutral is grounded through a resistance $R_n := 0.10 \cdot pu$.

   Just draw the schematic. You may leave out the X values, but show where R_n fits in and the value of that part.

6. Textbook problem 13-14

   a) For the impedance relay of Fig. 13-20 applied to protect the transmission line from Bus-2 to Bus-3 in Example 13-2. It is placed at Bus-2. Calculate the point in the impedance plane (the impedance) for a three-phase fault that is 85% of the line length away from Bus-2.

   b) Repeat this if the fault is 15% of the line length away from Bus-2.

Answers

1. $\mathbf{I_{fault}} = \mathbf{I_b} = 4.063 \cdot pu \quad -173.38 deg$
2. $3.588 \cdot pu \quad \angle -155.4 \cdot deg$
3. $5.304 \cdot pu \quad 143.2 \cdot deg$
4. $2.080 \cdot pu \quad -63.78 \cdot deg$
5. Be sure to triple R_n and show the open caused by the transformer winding.
6. a) $0.085 \cdot j \cdot pu$ b) $0.015 \cdot j \cdot pu$