EE 5223 - Assn#9 - Due Mar 28, 2023 9am

1) [10 pts] An simple single phase impedance relay is set for $Z = (R-1)^2 + (X-2)^2 = 4$. It protects two lines. The first line has an impedence of $Z = .5 + j2$. The second line (in series) has an impedance of $Z = 1 + j3$. What percentage of the second line is protected. Draw the R-X diagram and use it to illustrate your solution.

2) [20 pts] An impedance relay at Breaker #1 monitors the impedance of line GH. A three phase fault occurs at the midway point of line HR. (Generator pre-fault voltages are both $1.0 \angle 0°$ p.u.)

a) If the relay was set for $Z_{GH} + 0.5\, Z_{HR}$, will it trip?
b) Calculate the actual impedance "seen" by the relay.
c) How much of line HR is the relay actually protecting?