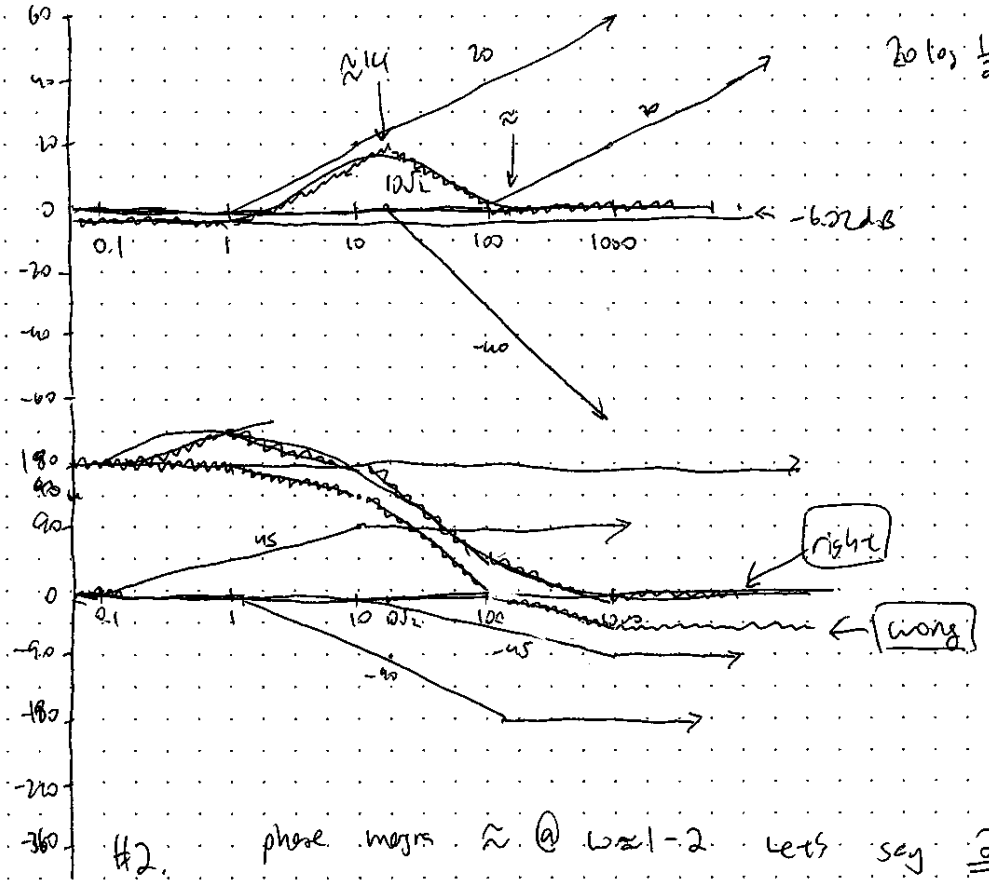
PROBLEM 3

1. $$\frac{(j\omega+1)(j\omega-100)}{(j\omega)^2+20(j\omega)+200} = \frac{(j\omega+1)\left(\frac{j\omega}{100}-1\right)\cdot 100}{\left(\left(\frac{j\omega}{10\sqrt{2}}\right)^2+\left(\frac{j\omega}{10\sqrt{2}}\right)\cdot\sqrt{2}+1\right)200}$$

$$= -\frac{1}{2}\,\frac{(j\omega+1)\left(-\frac{j\omega}{100}+1\right)}{\left(\frac{j\omega}{10\sqrt{2}}\right)^2+\left(\frac{j\omega}{10\sqrt{2}}\right)\sqrt{2}+1}$$



#2. phase margin ≈ @ $\omega \approx 1-2$ Let's say 2. for fun.

@ $\omega = 2$, ϕ really close to $180+45 = 225$

Let's say 230

That is a phase margin of 50°