Problem 1

(a) We see that

$$K = 8.3 \cdot 10^{-4} = \frac{[CO][Cl_2]}{[COCl_2]} = \frac{[CO]^2}{[COCl_2]} \rightarrow [CO] = [Cl_2] = 0.0407$$

and thus

$$[COCl_2] = 2.00\,M - 0.0407\,M = 1.9596$$

Problem 2

(a): To the products

(b): To the reactants

Problem 3

Let's try writing the correct RICE table, but assuming they meant to say gaseous NO:

$NOBr$	NO	Br_2
2	0	0
$-2x$	$+2x$	$+x$
$2-2x$	$2x$	x

$$\Rightarrow 0.0142 = \frac{4x^3}{4 - 4x + 4x^2}$$

$$0 = 4x^3 - 0.0142(4 - 4x + 4x^2)$$

$$= 4x^3 - 0.0568 + 0.1136x - 0.0568x^2$$

$$= 3.9432x^2 + 0.1136x - 0.0568$$

Solving for x, ~~$x = 0.113$~~ with the TI-84

$$0.0142(2-2x)^2 - 4x^3 = 0$$

$$x = 0.2074$$

Thus,

$[NOBr] = 1.585$

$[NO] = 0.415$

$[Br_2] = 0.207$