<u>LeChatelier and "K" calculations</u>

1.	SO_2 (g)	+	NO_2 (g)	$\rightleftarrows$ SO_3 (g)	+	NO (g)
E	4.0 M		0.50 M	3.0 M		2.0 M

1.5 mol of the NO_2(g) is added to the 1.00 L equilibrium vessel.
What is the new equilibrium concentration of all species?
<u>**Graph**</u> both equilibrium concentrations on the same graph.

E_1	4.0 M	0.50 M	3.0 M	2.0 M
R				
E_2				

2.	SO_2 (g)	+	NO_2 (g)	$\rightleftarrows$	SO_3 (g)	+	NO (g)
E_1	4.0 M		0.50 M		3.0 M		2.0 M
			+ x				
R							
E_2					4.0 M		

What was the stress imposed on this equilibrium system?
(Give a numerical answer, as well as a solution statement).

3. Given:
a) $K = 1.5 \times 10^{12}$
b) $K = 0.15$
c) $K = 4.3 \times 10^{-15}$

Which one has a large ratio of products to reactants? WHY?

4. $H_2\,(g) + S\,(s) \rightleftharpoons H_2S\,(g) + kJ$

Given: $\dfrac{0.200\,mol}{2.00\,L}$ **X** $\dfrac{0.200\,mol}{2.00\,L}$

Qn # 1: explain why it doesn't matter that I didn't take into account that sulphur is octatomic when I balanced my equation.

$$8H_2\,(g) + S_8\,(s) \rightleftharpoons 8H_2S\,(g) + kJ$$

Qn#2: Is the given data at equilibrium?
(If K at this temperature is given as 14.3).
If not, what must happen for this system to be at equilibrium?

In your answer, we must start using the following notation:

$$K_{eq} \quad > / < / = \quad K_{trial}$$

5.	A (g)	$\rightleftarrows$	2B (g)	+	C (g
I	$\frac{1.00 \text{ mol}}{4.00 \text{ L}}$		-----		-----
R					
E	☐		0.10 M		0.05 M

$K = 2.5 \times 10^{-3}$

Calculate $[A]_e$

b.	A (g)	$\rightleftarrows$	2B (g)	+	C (g
E_1	☐		0.10 M		0.05 M
	+ 0.10 M				
R					
E_2					

Calculate the new $[A]_e$ $[B]_e$ $[C]_e$ at the same temperature, under the stress that was imposed as shown in E_1.

6a. H_2 (g) + CO_2 (g) ⇄ H_2O (g) + CO (g)

I	0.500 M	0.500 M	-----	-----
R				
E				

Calculate all four [ ]$_e$ if K = 2.00.

6b. Given new E_2 concentrations, calculate K and describe what stresses could have caused this shift, resulting in these new concentrations:

E_2	0.105 M	0.105 M	0.145 M	0.145 M

6c. Given new E_2 concentrations, calculate K and describe what stresses could have caused this shift, resulting in these new concentrations:

E_2	0.240 M	0.240 M	0.133 M	0.133 M

6d. Given new E_2 concentrations, calculate K and describe why we could not explain a stress that would cause the concentrations to change to these numbers (i.e. why these “equilibrium” values would be impossible):

	H_2 (g)	+	CO_2 (g)	$\rightleftarrows$	H_2O (g)	+	CO (g)
E_2	0.117 M		0.117 M		0.133 M		0.133 M

6e.

	H_2 (g)	+	CO_2 (g)	$\rightleftarrows$	H_2O (g)	+	CO (g)
E_1	0.117 M		0.117 M		0.133 M		0.133 M
R							
E_2	0.150 M						

Calculate how much H_2O (g) was added to the E_1 vessel if K at **<u>this</u>** temperature is equal to 1.29.

6f. On a separate piece of paper (fill the page) graph the equilibrium values, stresses, shifts and new equilibrium values for questions 6b and 6c.