Math 331 Worksheet 2

Note: None of these problems are for a grade, though you may obtain extra credit for writing up proofs on the board.

1) From last time: prove that $\sum_{k=1}^{n} k = \dfrac{n(n+1)}{2}$. If your proof was not pictorial, can you find a way to make a pictorial proof?

2) Take another look at the proof on pages 25-26 that all triangles are isosceles. Be sure everyone can find the flaw in the argument. Do you agree with the title of this section, "The Danger in Diagrams"?

3) Here is another flawed argument. You'll have no trouble identifying the error in the conclusion; where is the problem in the reasoning?

-Let $a = b \neq 0$.
-Then $a - b = 0$.
-Square both sides to obtain $a^2 - 2ab + b^2 = 0$.
-Adding $2ab$ to both sides, $a^2 + b^2 = 2ab$.
-Since $a = b$, $2ab = 2b^2$, so $a^2 + b^2 = 2b^2$.
-Subtract $2b^2$ from both sides to obtain $a^2 - b^2 = 0$.
-Factor the left hand side to get $(a - b)(a + b) = 0$.
-Divide both sides by $(a - b)$, so $a + b = 0$.
-Since $a = b$, $2a = a + b = 0$.
-Divide both sides by a to obtain $0 = 2$.

4) Discuss how you would construct an equilateral triangle using only straight-edge and compass given one side. If you have these handy tools available, carry out your procedure.

5) Examine Viète's Axiom on page 33. Is it obvious to you that this axiom does not follow from Euclid's postulates? Why or why not?