Math 291
Lab 5
Due Monday April 8, 2019

Instructions: Use LaTeX to typeset a document containing each component described below. Turn in your lab in D2L Brightspace. You should submit both your raw TeX (.tex) file and your compiled document (in a form where the pictures work, probably pdf). Do *not* submit a .zip file.

You will be graded on both your raw TeX code and the accuracy of your compiled document. **Don't forget to include Lab8 in your filename**.

1. Your first page should be a title page with the same requirements for it as in Lab 7 (except for updating to Lab 8).

2. Your second page should be a list of figures that is generated from the appropriate items below. It should be alone on its page.

3. The third page should be the SunnyFlower.jpg, sized to match your textheight and textwidth exactly (in other words, it might be morphed a bit since the ratio of the textheight and textwidth may not match the ratio of height and width of the picture, and it is not a figure, just the graphic).

4. The fourth page should have the two pictures safety.jpg and Friends.jpg, one directly above the other, both with widths set to be the textwidth and heights set to be half of the textheight, and the keepaspectratio option should be used to avoid deforming the pictures. Both pictures should be centered.

5. The next page should start with a figure that

   - uses the placement parameter of h
   - uses the picture Warmth.jpg
   - has the caption "Jackie thinks Marble is a nice heat source."
   - the caption is *above* the picture
   - the picture has the height specified to be 2 includes, the width specified to be 2 inches, and the keepaspectratio option is used
   - the picture is *not* centered
   - label the figure with the name Fig:Warmth

6. After that first figure, type enough random sentences/words/characters that you have two lines of text. Then add a second figure that

   - uses the placement parameter of t
   - uses four pictures in a row: CatsLoveReading.jpg, CeilingCat.jpg, OrangeBox.jpg, and Patch.jpg
   - choose the same textwidth for each, and chosen so all pictures fit on the row, and make sure that the height/width ratio of each picture is also maintained

- the figure should have the caption "Four different cats, none of them black" *under* the pictures
- label the figure with the name Fig:Four

7. After that second figure, type enough random sentences/words/characters that you have two lines of text. Then create a third figure that
   - uses the placement parameter of b
   - uses the picture CatTree.jpg, but rotates it so that it us upright (as it should be)
   - resizes the picture using the scale option so that it is 10% of the size of the original picture
   - has the caption "Mother ignoring rambunctious kittens" under the picture
   - centers the picture
   - labels the figure as Fig:Tree
8. After that third figure, type enough random sentences/words/characters that you have two lines of text. Then create a fourth figure that
   - has no placement parameter
   - centers the equation $x = \dfrac{3\ln(2) - 5\ln(7)}{4\ln(8) + 5\ln(2)}$ as the content of the figure
   - has the caption "Solution to an exponential equation from Math 127"
   - label the figure as Fig:Math
9. After that fourth figure, type enough random sentences/words/characters that you have two lines of text. Then create a fifth figure that
   - has whatever placement parameter you prefer
   - centers three copies of the picture Kittens.jpg on a single line, all scaled to the same size, but each with a different rotation (and none of the rotations equal to 0, 90, 180, or 270 degrees or any angle coterminal with any of these), and with each angle a visually different angle from the others.
   - has the caption "Dizzy sleeping kittens" under the line of pictures
   - has the label Fig:Kittens
10. Then type (or copy and paste and then adjust) the following paragraph, where the numbers for both the pictures and the pages are correct and come from referencing the labels in your five figures (not by just typing in the number):

    The pictures come in order, so even though Figure 2 had enough room to fit on page 5, since it was also told to be on the top of the page, which owuld have moved it prior to Figure 1, it got moved to page 6 instead. But Figure 3 was told to be at the bottom of the page, and it wasn't put there, instead Figure 4 was put there. They are both on the bottom of the page, so LaTeX is happy with

that. Note that all of the lines in between the figures, and this paragraph, got grouped together as soon as they fit, which was well before most of the figures. Also note that in Figure 5, the rotations can make it seem as if things aren't lined up even if they would seem to be in the code. Sometimes things like that are adjusted manually, or in the original picture using some photo-editing software instead of the rotation features of LaTeX. In this case that is caused by the point around which the rotation happens.

11. Then, add a new page after all of the figures, and then do the following using an enumerate environment.
Load the amsthm package and in the preamble create an enumerated definition environment, an enumerated axiom environment, an enumerated note environment, and an enumerated theorem environment. Then use them to typeset each of the following. In Note 8.3 below, the statement about my opinion needs to be an optional title in the note environment, similar to the Fundamental Theorem of Calculus title in the lecture. (Note that you may need to reset the counter for some of these. See Lecture 7 for how to do that.) [Source: Euclid's Elements, by Thomas L. Heath]

    (a)

    Definition 1. *A point is that which has no part.*

    Definition 2. *A line is breadthless length.*

    (b)

    Axiom 1. *Things which are equal to the same thing are also equal to one another.*

    Axiom 2. *If equals be added to equals, the wholes are equal.*

    (c)

    Note 8.1. *In Euclid's Elements, a distinction is made between postulates and axioms.*

    Note 8.2. *In Heath's translation, axioms are called common notions.*

    Note 8.3 (My opinion)**.** *Heath's translation also has frequent and long footnotes that refer back to the original Greek, and are often more of interest to someone who is interested in the nuances of a language and its translation than they are in the math being discussed.*

    (d)

    Theorem 1. *There are infinitely many prime numbers.*

    Proof. Professor waves a magic wand. □