Name: _____

Date: _____

Collaborators: _____

(If applicable, the collaborators submit their individually written assignments together)

Question:	1	2	Total
Points:	50	30	80
Score:			

Instructor/grader comments:

1. Hermite polynomials is a particular kind of *special functions* that are important in physics and applied mathematics.

   Hermite polynomials are defined as follows:

   $$H_n(x) = (-1)^n e^{x^2} \frac{\mathrm{d}^n}{\mathrm{d}x^n} e^{-x^2}, \quad -\infty \le x \le \infty. \tag{1}$$

   Hermite polynomials $H_n(x)$ satisfy the following recurrence relations:

   $$H_{n+1}(x) = 2x H_n(x) - 2n H_{n-1}(x), \quad n = 1, 2, \ldots; \quad H_0(x) = 1,\ H_1(x) = 2x. \tag{2}$$

   (a) (15 points) Create a directory for your homework project (`mkdir hw02`), change to that directory (`cd hw02`), create an empty README.md file ~~(`touch README.md`)~~ (`echo " " > README.md`). Download .gitignore sample file and properly rename it: (`wget https://.../downloads/sample.gitignore; mv sample.gitignore .gitignore`). For the first time only: start julia inside the folder, activate the project (`] activate .`) and add packages you will use (`] add IJulia, PyPlot`, etc.). Exit julia and start jupyter server (`ijulia`).

   (b) (15 points) Use jupyter notebook interface in your browser to write a function `myhermite(n,x)` that uses recurrence relations (2) to calculate the value of Hermite polynomial $H_n(x)$

   (c) (15 points) In the same notebook, use your function to plot, in one figure, the graphs of $H_2(x)$, $H_3(x)$, and $H_5(x)$ for $-3.0 \le x \le 3.0$. Use 200 data points per graph. Restrict the plotted values of polynomials to $-50.0 \le y \le 50.0$. Provide the legend, grid, title, axes labels for the plot.

   (d) (5 points) Clean the cells of your jupyter notebook. Save your notebook as a file named **hermplot.ipynb**. (Do not save your plot as a separate graphics or pdf file.) Delete unneeded notebooks if you created ones (e.g. `Untitled.ipynb`).

2. (30 points)

   1. On the GitLab "side": Create an empty GitLab project called **hw02** (name it exactly as shown).

   2. On the VM "side" (use the instructions shown to you in the previous step): Initialize a git repository for hw02. Check in your notebook, Project.toml and Manifest.toml, an empty README.md file, and your .gitignore file into the repository. Provide a meaningful commit message. Push the content of your git repository to GitLab hw02 project.

   3. On the GitLab "side": Edit README.md file to briefly describes Hermite polynomials and the algorithm that you used to calculate them. Use markdown to write

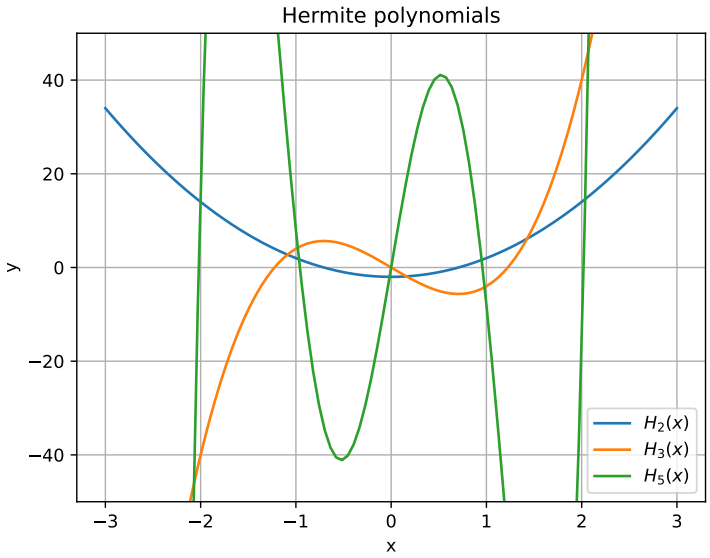

Figure 1: Expected graph in Problem 1.

inline and displayed equations as well as some text with headers, regular, italic, and bold fonts.

4. On the VM "side": Pull the README.md file to your local git repository (`git pull`).
5. On the GitLab "side": Share the project with the instructor (GitLab user name p2200_23f_in) and grant him **Reporter** privileges.

I have synchronized the contents of my local (VM) and remote (GitLab) git repositories that I created for hw02 assignment

Sign and date here: _____