Review sections §12.1 and §12.2 in Hughes-Hallett.

The odd numbered problems in the Exercise sections (the first chunk of problems) in §12.1 and §12.2 are worthwhile practice for before the problem set. *Answers are in the back for odd numbered problems, and solutions are in the student solutions manual on reserve in Cabot.*

1. Start using Piazza. Head to Canvas and choose the Piazza tab.

   - Post a question or a short note. You can ask the course staff and fellow students something like "what was an interesting topic in a previous math course?" or "what are you looking forward to in 21a?". Label your post with a relevant 'tag' (pset01, for example). Then click around and explore Piazza. You may want to try writing some mathematics in Piazza using Latex. Latex allows you to type out mathematics more easily. Try

     ```
     $$ \int f(x)dx $$
     ```

     for example, or

     ```
     $$\frac{df}{dx}$$
     ```

     or look up how to latex a different math expression.

     You are welcome to post anonymously to your fellow students.

2. Complete the problems assigned via WeBWorK.

   For reference, problems are identified as:

   Hughes-Hallett 12.1 2, 5, 7, 7, 13, 28, 29, 30, 31, 12.2 15, 16

   Stewart 13.1 3, 14.1 1

3. For question 11 of the WeBWorK, you are matching functions $f(x, y)$ to graphs of points (x, y, z) where $z = f(x, y)$.

   Provide a written justification for each match that you've made. Use complete sentences and clearly explain which details enabled you to make the match.

   Submit this writeup via Gradescope.

4. Install Matlab on your machine, or make sure you have regular access to a machine on which Matlab is installed.

   (a) You'll be making a plot to post to Piazza. There will be four threads on Piazza for posting these images. Choose one of the threads and look at each of the (quadratic) functions already plotted. When you make your plot, use a different quadratic function than any of the others in the thread that you choose.

   (b) Modify the following Matlab code to plot a different quadratic function. (A function where the maximum degree of the monomials is two. For monomial degree, see `https://en.wikipedia.org/wiki/Monomial#Degree`).

```
% The percent symbol starts a comment.  You don't need to copy my ...
    comment lines into your code.
% ... allows a line to wrap to the next one without being treated ...
    as a separate line by matlab.
```

```
syms x y  % Tell matlab which variables to treat as symbolic.
points = [x, y, x^2-2*y^2];  % points (x,y, f(x,y)).
fsurf(points(1), points(2), points(3), [-1 3 -2 2])  % plot the ...
    points for -1 < x < 3 and for -2 < y < 2.
view([3 -3 1]); % set the view (rotation) of the axes.
title('z = x^2-2y^2'); % add a title
xlabel('x'); ylabel('y'); zlabel('z'); % and add axis labels.
set(gca,'FontSize',16); % make the fonts bigger.
grid off;
axis equal; % set the axes to all have the same scale
```

(c) Export your plot to a jpeg and post it to Piazza. To do this: once you've made your plot, head to the figure, and under its File menu, choose 'Export Setup...'. In the window that pops up, choose Export, change the file format to .jpg. In the thread that you chose, scroll to the bottom, and start a new followup discussion. Post your figure there.

Late work policy: A late write-up will be accepted up to two days late (so by Sunday at 10am). A late write-up is worth up to 95% of the credit of an assignment submitted on time. Late write-ups include the Gradescope and Piazza portions of this assignment.

Late WeBWorK is only accepted in the case of documented illness or a religious conflict (in which case it is accepted without penalty). For illness, please send documentation, along with a note from your Resident Dean, to Emily Venable at `venable@fas.harvard.edu`. For a religious conflict, please make advance arrangements with Emily.

Webwork tips:

- Q1: To reason about the sign of the derivative along a line through one of the cities it is important to keep track of what direction you're moving along the line.

  When we draw a horizontal line, negative x is on the left and positive x is on the right, so to decide the sign of the derivative, you'll want to think about what happens to the function as you move from left to right along the line.

  When we draw a vertical line, negative y is down and positive y is up, so to decide the sign of the derivative you'll want to think about what happens to the function as you move from down towards up.

- Q3: For the value of the function, you don't need to find the actual number yourself, although it's great if you do. However, if you write things like `17*3*e^(2*5)` WeBWorK will simplify them.

- Q6: Two notes: (1): It can be helpful to remember that sphere and cylinder are technical words in this course. A sphere is the set of points equidistant from a particular point. It is a type of surface. A cylinder is also a type of surface.

  In colloquial usage we are used to spheres and cylinders being solid. In this course, we'll use the terms solid ball or solid cylinder for the regions, and the terms sphere and cylinder for the surfaces.

(2): Recall that the xy-plane is the set of points $(x, y, 0)$. This is the set of points where $z = 0$. The other two planes are analogous. Recall that the z-axis is the set of points $(0, 0, z)$. This is the set of points where $\begin{cases} x = 0 \\ y = 0 \end{cases}$. The other two axes are analogous.