

## Homework Set 5: Differentiation

- Problem 5, Cubic Splines (integrate with splines). Turn in the script file you used, together with your antispline code.
- Implement the code we wrote in class for differentiating a row (or a column) of data: `numdiff.m`
- Apply the code in the previous problem to an image (which is an array of integers corresponding to color). The image we will use is in Matlab,

```
load clown
image(X)
colormap(gray)
```

The  $200 \times 320$  array is in the variable  $X$ . We will use `numdiff` on each row to compute  $f_x$  and each column to approximate  $f_y$ . For example,

```
for j=1:320
    dY(:,j)=numdiff(1,X(:,j));
end
imagesc(dY)
```

Write your code in a script file, and save it as HTML. Print the results and turn it in.

*Side note: The derivatives are used in edge detection algorithms. Do you see why?*

- Problems 2, 5, 9, 13 in Section 5.1. You may use Maple to do the algebra in Problem 13.