Homework 2

CSC-432

Due: 2/4/13

Calculus Review

1. Complete the following problems in Shiflet and Shiflet. *Note:* Most of these can be completed using Python. Get used to using Python, even as a calculator. For instance, if the problem is `Estimate the following to 2 decimal places:  2 plus 2 all divided by 6`. You might write

```
print "%4.2f" % ((2 + 2.)/6)
```

Instead of

```
# (2+2)/6 = .67
```

A few questions give you the option to use a computational tool or do the calculus by hand. I will be looking for computational answers, though you may, of course, do both in order to check your work.

```
Module 2.3 - Exercises 2, 5, 7, 9, 10
Module 2.4 - Exercises 1, 3, 4
```

2. Find the first derivatives of the following functions

If you want to write out 2 and 3 and turn these in, that is fine.

1. $y = 30x + 10$
2. $y = 8x^2 - 6x + 12$
3. $y = \sqrt{3 - 2x^2}$
4. $y = \frac{7}{4}x^4$
5. $y = \frac{1}{3}x^{-2} - 2x$
6. $y = e^{2x^3}$
7. $y = \ln 2x^{-2}$
8. $y = \left(5x^2 + 10x + 3\right)^5$
9. $y = \frac{3x^3+2x^2+x-4}{x}$
10. $y = 3x^3 \ln x^2$

3. Evaluate the above derivatives by hand at $x_0 = 3$ and $x_0 = 6$.

4. Evaluate the above derivatives using numerical differentiation, and test the results vs. what you got by hand in 3.

You will want to use `scipy.misc.derivative` to evaluate the derivatives and `numpy.testing.assert_almost_equal` to test that your function achieves the desired result.