MA211: Review Assignment

- Quiz over this homework on September 5th.

Any problems marked with $*$ require the use of maple. All other problems are to be done by hand. Any problems marked with $\#$ can be submitted for review by the grader.

1. Compute the following indefinite integrals by hand.

   (a) $\int -3xe^{3x^2}dx$

   (b) $\#$ $\int \frac{1}{u(\ln(u)+1)}du$

2. Compute the following definite integrals by hand.

   (a) $\int_0^\pi x\sin(x)dx$

   (b) $\int_1^a \frac{1}{t}dt$

   (c) $\#$ $\int_0^\infty se^{-s}ds$

3. $\#$ If $\frac{dy}{dx} = 2\sqrt{x} + \ln(x)$ and $y(1) = 4/3$, find $y(4)$ by using integration techniques.

4. Consider the following functions defined on $x \in (-\pi/2, \pi/2)$.

$$\sin(x) \qquad -\cos(x+\pi/2) \qquad \frac{\sin(2x)}{2\cos(x)} \qquad \sin(x-\pi) \qquad \cos(x-\pi/2)$$

   Four of these are equal. Which four? Prove your answer.

5. (a) By trying a few integration techniques, convince yourself that you can't compute $f(t) = \int_0^t e^{x^2}dx$ by hand.

   (b) By hand, compute $f'(1)$ and $f''(0)$.

   (c) *Use Maple to integrate $\int_0^t e^{x^2}dx$. The answer probably won't mean much to you.

   (d) *Use Maple to plot $f(t)$ on $[-2, 3]$.

   (e) *Use Maple to compute $f(1)$ to three decimal places.

6. $\#$ If $xy^2 + \sin(x+y) = 4$, find expressions for $\frac{dy}{dx}$.

7. $\#$ Expand the following function in a partial fraction decomposition.

$$\frac{3x^2 - x + 1}{x(x^2+1)}$$