Prerequisite Quiz

Statistics 200A, Nathan Ross, Fall 2011

Instructions: This is a self quiz to determine proficiency in the prerequisites for Stat 200A. You should be able to do the questions below without referencing supplementary materials (e.g. books, internet, notes).

1. Find all the first and second derivatives of $f(x, a) = x^a$, assuming $x > 0$. Why do we make this last assumption?

2. Find the following limits.

$$\lim_{n\to\infty} \frac{2n^2 + 3n - 5}{3n^2 + 5n - 2}, \qquad \lim_{n\to\infty} \sum_{j=1}^{n} 2^{-j}, \qquad \lim_{x\to 0} \frac{e^x - 1}{x}.$$

3. Solve the following integrals.

$$\int_x^\infty (x + y)e^{-xy}dy \quad \text{and} \quad \int\int_{x^2+y^2\leq 1} (x^2 + y^2)^{-1/2}\, dx\, dy.$$

4. Find the derivative with respect to x of

$$\int_0^{\log(x)} \cos(e^t)dt \quad \text{and} \quad \int_x^\infty (xy + 1)e^{-y^2/2}dy.$$

5. Let

$$A = \begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} -2 & 4 \\ 1 & 1 \end{pmatrix}.$$

Find $4A + B$, $A - 3B$, AB, B^{-1} and a matrix C such that $C^2 = A$ and a matrix R such that $RR^T = A$.