Practice for Quiz 10
Math 2580
Spring 2016

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If you can answer the following problems, you should be well-prepared for Quiz 10:

1. Find the following antiderivatives:

   (a) $\displaystyle\int e^{3x}\,dx$

   (b) $\displaystyle\int \cos(x)\,dx$

   (c) $\displaystyle\int \frac{2x}{1+x^2}\,dx$

   (d) $\displaystyle\int x\sin(x)\,dx$

   (e) $\displaystyle\int \sin^2(x)\,dx$

   (f) $\displaystyle\int \frac{1}{\sqrt{4-x^2}}\,dx$

2. Sketch the following rectangles in $\mathbb{R}^2$:

   (a) $[-1,2]\times[0,2]$

   (b) $[1,4]\times[-1,1]$

3. For each of the rectangles from Problem 2, determine uniform partitions $x_0 < x_1 < x_2 < x_3$ of the x-interval into three sub-intervals and $y_0 < y_1 < y_2$ of the y-interval into two sub-intervals. Use these partitions to divide the given rectangle into six sub-rectangles R_{ij}, with $1 \le i \le 3$ and $1 \le j \le 2$.

4. Sketch each of the subsets of $\mathbb{R}^2$ below and express them as both a Type 1 region and a Type 2 region:

   (a) The region bounded by the coordinate axes and the line $x + y = 1$.

   (b) The region bounded by the curves $y = \sqrt{x}$, $y = 0$, and $x = 4$.

   Note: a region is called a Type 1 region (or "vertically simple") if it lies between the graphs of two functions $y = f_1(x)$ and $y = f_2(x)$. (So $f_1(x) \le y \le f_2(x)$, where $a \le x \le b$.) A region is a Type 2 region (or "horizontally simple") if it lies between the graphs of two functions $x = g_1(y)$ and $x = g_2(y)$. (So $g_1(y) \le x \le g_2(y)$, where $c \le y \le 2$.)