Math. 301-02
Summer, 2005
R. B. Kearfott

First Examination

Wednesday, June 15, 2005

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet.

1. (20 points) If $F'(x) = f(x)$ is as in the graph in figure 1, and $F(0) = 0$, then draw a corresponding graph of $F(x)$. Be sure to label the axes on your graph.

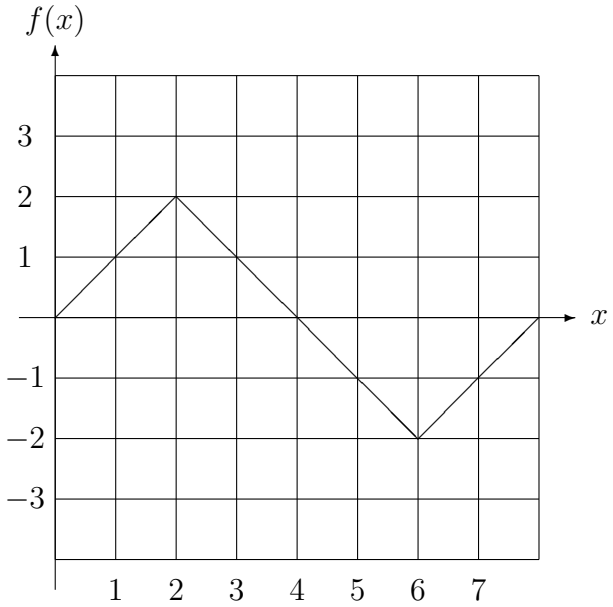

Figure 1: The figure for problem 1

2. (5 points apiece) Compute the following antiderivatives.

   (a) $\int x^2 + 2x + 1 dx$ (b) $\int (x+1)^2 dx$ (c) $\int 2x \sin\left(x^2\right) dx$

   (d) $\int t^2 e^t dt$ (e) $\int x \ln(x) dx$ (f) $\int \dfrac{1}{(x+1)(x+2)} dx$

3. (20 points) Compute the area bounded by the graph of $y = x^2 + 2x + 1$, the x-axis, and the lines $x = 0$ and $x = 2$.

4. (30 points) A 727 jet needs to be flying 200 mph to take off. If it can accelerate from 0 to 200mph in 30 seconds, how long must the runway be? (Assume constant acceleration.)