

First Examination
Tuesday, September 13, 2011

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. In the grades, two points are “free.”

1. (20 points) Sketch a graph of a possible antiderivative $F(x)$, if $F'(x) = f(x)$ and $F(0) = 1$, where the function $f(x)$ is given in Figure 1. Be sure to label the points A, B, C, D, E, F, and G on your graph of the antiderivative. You may assume the distance between points A and B is 1 and the height of the graph at B is 2.

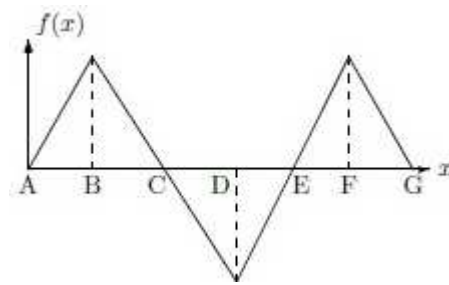


Figure 1: The derivative f for Problem 1

2. (10 points apiece) Compute derivatives of the following functions.

(a) $\int_0^x \frac{1 + 2t + 3t^2}{4t^3 + 5t^4 + 6t^5} dt$ (b) $\int_0^{\ln(x)} \sin(u) du$ (c) $\int_x^{x^2} \zeta^2 d\zeta$

3. (10 points apiece) Compute the following indefinite and definite integrals.

(a) $\int 2xe^{x^2} dx$ (b) $\int \frac{[\ln(x)]^3}{x} dx$ (c) $\int_0^{\pi^2} \frac{\sin(\sqrt{t})}{2\sqrt{t}} dt$

4. (20 points) A ball is thrown straight up with a velocity of 30 meters per second. When will it hit the ground? (You may assume the acceleration due to gravity is -9.8 meters per second per second.)