

This is a collection of study problems in preparation for the third in-class exam, which will be given on Friday, April 1, 2011. It is in addition to the sample exam, and serves as an optional second sample exam (but not for credit).

Do the following ten problems under the same conditions as the actual exam. Give yourself 50 minutes. While doing these problems, you may refer to a two-sided handwritten sheet of notes, not to exceed $8\frac{1}{2}$ by $5\frac{1}{2}$ inches. No other notes should be consulted, and you should not use any electronic devices such as calculators or computers. Eight of the problems below are from old final exams; those can be found by going to

<http://www.math.upenn.edu/ugrad/calc/m104/oldexams.html>.

1. Spring 2010 final, #11.
2. Spring 2010 final, #14.
3. Spring 2010 final, #15.
4. Spring 2010 final, #16.
5. Spring 2010 final, #17.
6. Spring 2009 final, #5.
7. Spring 2009 final, #12.
8. Spring 2009 final, #13.
9. A rod lies on the x -axis along the interval $0 \leq x \leq 2$. The density of the rod at the point x is given by $\rho(x) = 1 + 2x$. Where is the center of mass of the rod?
 (a) $x = 0$ (b) $x = 1/2$ (c) $x = 1$ (d) $x = 11/9$ (e) $x = 15/13$ (f) $x = 2$
10. The probability density function corresponding to the waiting time for a bus is $f(t) = e^{-t}$ for $t \geq 0$, and $f(t) = 0$ for $t < 0$, if you begin waiting at time 0. What is the probability that the next bus will arrive no later than time $t = 3$?
 (a) 0 (b) 1 (c) $1/2$ (d) $1/e^3$ (e) $1 - 1/e^3$ (f) $\ln(3)$