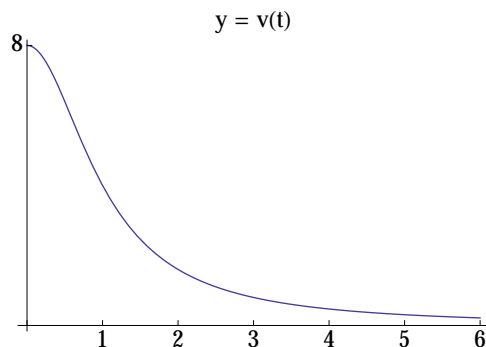


Math 10B
Midterm Exam 1
January 27, 2015
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Version A

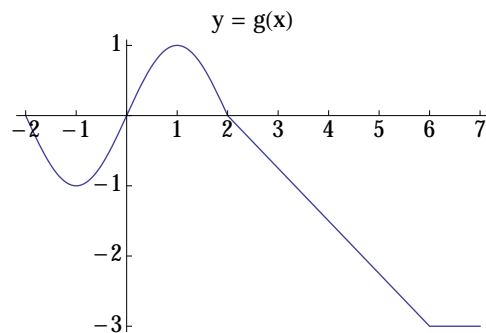
Instructions

1. Write your *Name*, *PID*, *Section*, and *Exam Version* on the front of your Blue Book.
2. No calculators or other electronic devices are allowed during this exam.
3. You may use one page of notes, but no books or other assistance during this exam. If you violate these instructions or communicate in any way with any other student during this exam, you will receive a zero on the exam, and the zero will not be dropped when calculating your cumulative course average.
4. Write your solutions clearly in your Blue Book:
 - (a) Carefully indicate the number and letter of each question and question part.
 - (b) Present your answers in the same order they appear in the exam.
 - (c) Start each question on a new side of a page (you can write solutions to different parts of the same question on the same side of the same page in your Blue Book).
5. Show all of your work; no credit will be given for unsupported answers.

1. (6 points) A particle is moving along a straight line with a velocity of $v(t) = \frac{8}{1+t^2}$ centimeters per second. The graph of $y = v(t)$ appears below.

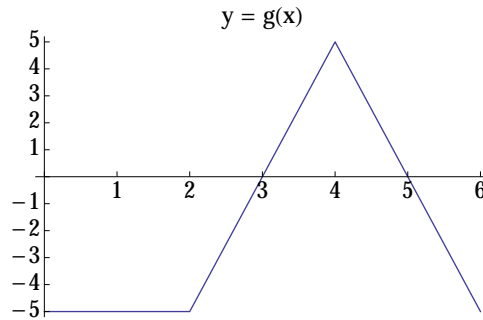


- (a) Use three rectangles of equal width to find an **underestimate** of the distance travelled by the particle between time 0 seconds and time 6 seconds. You do not have to simplify your answer.
- (b) (6 points) Use three rectangles of equal width to find an **overestimate** of the distance travelled by the particle between time 0 seconds and time 6 seconds. You do not have to simplify your answer.
2. (6 points) For all three parts of this problem, g is the function whose graph appears below. Answer the following questions, given that $\int_0^2 g(x) dx = 1$.

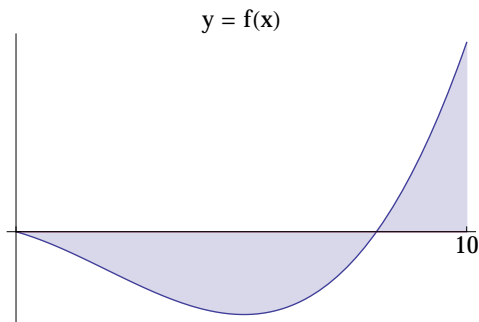


- (a) Evaluate the integral $\int_0^7 (g(x) + 8) dx$.
- (b) Suppose that G is an antiderivative of g , i.e. $G'(x) = g(x)$. Suppose also that $G(0) = 12$. Find $G(7)$.
- (c) If g is odd, what is the value of the integral $\int_{-2}^2 |g(x)| dx$?

3. (6 points) For both parts of this problem, let g be the function whose graph appears below.



- (a) Find the average value of g on the interval $[0, 6]$.
- (b) Suppose that G is an antiderivative of g , i.e. $G'(x) = g(x)$. On which interval(s) is G decreasing?
4. (4 points) Find the exact area of the region bounded by the graph of $f(x) = x^3 - 6x^2 - 16x$ and the x -axis between $x = 0$ and $x = 10$. In other words, find the exact (i.e. total) area of the shaded region in the figure below. You do not have to simplify your answer.



5. (4 points) Find the solution of the initial value problem:

$$\frac{dy}{dt} = 2 \cos(t) + \frac{4}{\pi}, \quad y(\pi/2) = 5$$