

## Calc I & II review – MA 225 B1 – Spring 2011

The purpose of these exercises is to emphasize that you are expected to know the material from Calculus I and II, and to highlight concepts that I feel are particularly important. It is not meant to be exhaustive, so just because a Calc I/II topic isn't here, it doesn't mean you don't need to know it.

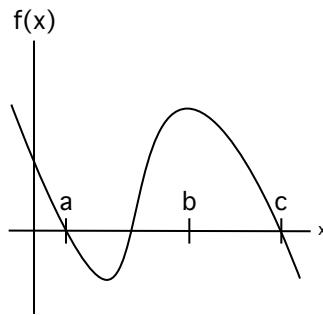
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**Question 1** Consider

$$f(x) = \sin(x)e^{1/x}, \quad g(x) = \frac{1}{(2x+1)^3}.$$

- (i) Find  $f'(x)$ .
  - (ii) Evaluate  $\int_1^\infty g(x)dx$ .
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**Question 2** Consider the following figure.



Give a geometric explanation (ie draw it on the picture or explain it using the picture) of the following quantities. Are they positive, negative, or zero?

- (i)  $f'(b)$
  - (ii)  $\int_a^c f(x)dx$
  - (iii)  $f''(b)$
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**Question 3**

- (i) State the limit definition of a derivative and explain how it corresponds to your answer to part (i) of the previous question.
  - (ii) State the definition of an integral using a Riemann sum and explain how it corresponds to your answer to part (ii) of the previous question.
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**Question 4** Write down an integral that represents the volume of the solid obtained by rotating the region bounded by  $x = 1 + y^2$  and  $y = x - 3$  about the  $y$ -axis. (You don't need to evaluate the integral.)

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**Question 5** A balloon is rising at a constant speed of 5 ft/s. A boy is cycling along a straight road at a speed of 15 ft/s. When he passes under the balloon, it is 45 ft above him. How fast is the distance between the boy and the balloon increasing 3s later?