University of California, San Diego
***Department of Mathematics***

Instructions

1. Write your *Name*, *PID*, and *Section* 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.

4. Read each question carefully, and answer each question completely.

5. Write your solutions clearly in your Blue Book

    (a) Carefully indicate the number and letter of each question.

    (b) Present your answers in the same order they appear in the exam.

    (c) Start each question on a new page.

6. Show all of your work; no credit will be given for unsupported answers.

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1. (10 points) The graph below is the graph of $y = f(x)$.

$$y = f(x)$$
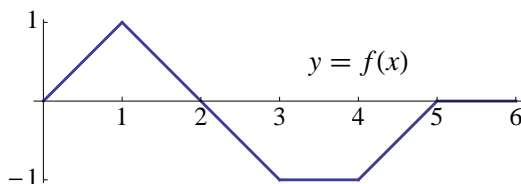
(a) Evaluate: $\displaystyle\int_0^6 f(x)dx =$

(b) Suppose F is an anti-derivative of f. On which interval(s) is F increasing?

(c) In your **Blue Book**, create a table like this:

x	0	1	2	3	4	5	6
$F(x)$							

    If $F(0) = 1$, fill in the table of values for $F(x)$.

2. (5 points) Let f and g be two functions. Somehow you know the values of the following definite integrals:

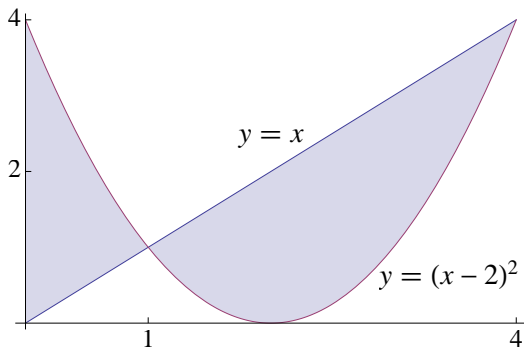$$\int_1^2 f(x)dx = -2, \quad \int_1^5 f(x)dx = 7, \quad \int_1^2 g(x)dx = 5.$$

Calculate the following definite integrals:

(a) $\displaystyle\int_1^2 \Big(3f(x) + g(x)\Big)dx =$

(b) $\displaystyle\int_2^1 f(x)dx =$

(c) $\displaystyle\int_2^5 f(x)dx =$

(Please turn over.)

3. (7 points) Suppose $\displaystyle\int_0^3 \left(x^2 + \frac{P}{3}\right)dx = 10$, where P is constant. Determine the value of P.

4. (8 points) Below are the graphs of $y = x$ and $y = (x-2)^2$. Use the Fundamental Theorem of Calculus to find the exact area of the shaded region. Note the curves intersect at $x = 1$ and $x = 4$.

(This exam is worth 30 points.)