AP Calculus BC 2 Assignment 221 Wednesday, March 18, 2015 Hour Name

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A Company makes industrial pipe that sells for \$120 per yard. For a pipe of a given length, the cost of producing a section varies with its distance from the beginning of the pipe. The cost to produce a segment of pipe that is x yards from the beginning of the pipe is $6\sqrt{x}$ dollars per yard.

a. Find Company's profit on the sale of the first 25-yards of cable.
b. Using correct units, explain the meaning of $\int_{25}^{30} 6\sqrt{x}\,dx$ in the context of this problem.
c. Write an expression, involving an integral, that represents the profit on the sale of the first k yards of pipe.
d. Find the maximum profit on the sale of the first segment of pipe. Justify your answer.

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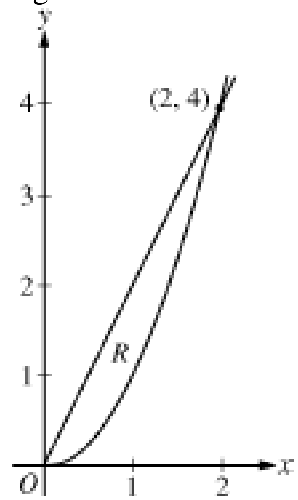

Let R be the region in the first quadrant enclosed by the graphs of $y = 2x$ and $y = x^2$, as shown in the figure above.

a. Find the area of R.
b. The region R is the base of a solid. For this solid, at each x the cross section perpendicular to the x-axis has area $A(x) = \sin\left(\frac{\pi}{2} x\right)$. Find the volume of the solid.
c. Another solid has the same base R. For this solid, the cross sections perpendicular to the y-axis are squares. Write, but do not evaluate, an integral expression for the volume of the solid.

x	2	3	5	8	13
f(x)	1	4	-2	3	6

Let f be a function that is twice differentiable for all real numbers. The values of f for selected points in the closed interval $2 \le x \le 13$ are given above.

a. Estimate $f'(4)$. Show the work that leads to your answer.

b. Evaluate $\int_2^{13} \left(3 - 5f'(x)\right) dx$. Show the work that leads to your answer.

c. Use a left Riemann sum with subintervals indicated by the data in the table to approximate $\int_2^{13} f(x)\, dx$.

Show the work that leads to your answer.

d. Suppose $f'(5) = 3$ and $f''(x) < 0$ for all x in the closed interval $5 \le x \le 8$. Use the line tangent to the graph of f at $x = 5$ to show that $f(7) \le 4$. Use the secant for the graph of f on $5 \le x \le 8$ to show that $f(7) \ge \frac{4}{3}$.

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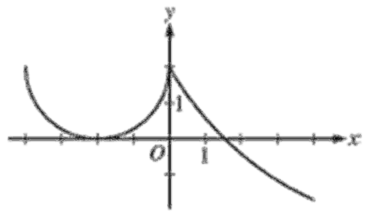

Graph of f'

The derivative of a function f is defined by $f'(x) = \begin{cases} g(x) & for\ -4 \le x \le 0 \\ 5e^{-x/3} - 3 & for\ 0 < x \le 4 \end{cases}$ The graph of the continuous function f ', shown in the figure above, has x-intercepts at x = -2 and $x = 3\ln\frac{5}{3}$. The graph of g on $-4 \le x \le 0$ is a semicircle and f(0) = 5.

a.	For -4 < x < 4, find all values of x at which the graph of f has a point of inflection. Justify your answer.
b.	Find f(-4) and f(4).
c.	For $-4 \le x \le 4$, find the value of x at which f has an absolute maximum. Justify your answer.