AP Calculus BC 2 Assignment 236 Monday, April 20, 2015 Hour Name

 Calculator

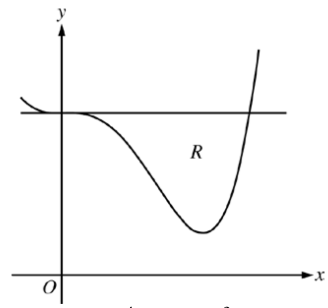
Grass clippings are placed in a bin, where they decompose. For $0 \le t \le 30$, the amount of grass clippings remaining in the bin is modeled by $A(t) = 6.687(0.931)^t$, where A(t) is measures in pounds and t is measured in days.

a. Find the average rate of change of A(t) over the interval $0 \le t \le 30$. Indicate units of measure.

b. Find the value of A'(15). Using correct units, interpret the meaning of the value in the context of the problem.

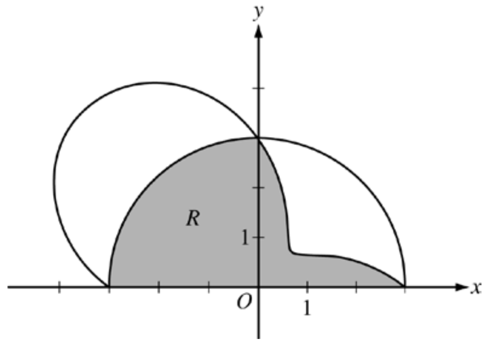
c. Find the time t for which the amount of grass clippings in the bin is equal to the average amount of clippings in the bin over the interval $0 \le t \le 30$.

d. For $t > 30$, L(t), the linear approximation to A at $t = 30$, is a better model for the amount of grass clippings remaining in the bin. Use L(t) to predict the time at which there will be 0.5 pounds of grass clippings remaining in the bin. Show the work that leads to your answer.



Let R be the region enclosed by the graph of $f(x) = x^4 - 2.3x^3 + 4$ and the horizontal line $y = 4$, as shown in the figure above.

a.	Find the volume of the solid generated when R is rotated about the horizontal line $y = -2$.
b.	Region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is an isosceles right triangle with a leg in R. Find the volume of the solid.
c.	The vertical line $x = k$ divides R into two regions with equal areas. Write, but do not solve, an equation involving integral expressions whose solution gives the value of k.



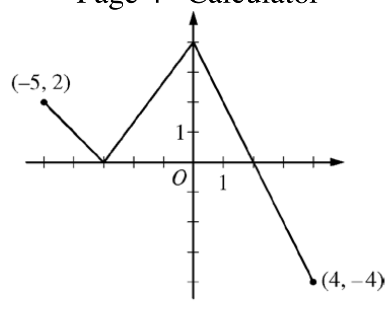
The graphs of the polar curves r = 3 and r = 3 – 2sin(2θ) are shown in the figure above for $0 \le \theta \le \pi$.

a. Let R be the shaded region that is inside the graph of r = 3 and inside the graph of r = 3 – 2sin(2θ). Find the area of R.

b. For the curve r = 3 – 2sin(2θ), find the value of $\frac{dx}{d\theta}$ at $\theta = \frac{\pi}{6}$.

c. The distance between the two curves changes for $0 < \theta < \frac{\pi}{2}$. Find the rate at which the distance between the two curves is changing with respect to θ when $\theta = \frac{\pi}{3}$.

d. A particle is moving along the curve r = 3 – 2sin(2θ) so that $\frac{d\theta}{dt} = 3$ for all times $t \ge 0$. Find the value of $\frac{dr}{dt}$ at $\theta = \frac{\pi}{6}$.



Graph of f

The function f is defined on the closed interval [-5. 4]. The graph of f consists of three line segments and is shown in the figure above. Let g be the function defined by g(x) = $\int_{-3}^{x} f(t)\,dt$.

a.	Find g(3).
b.	On what open intervals contained in -5 < x < 4 is the graph of g both increasing and concave down? Give a reason for your answer.
c.	The function h is defined by h(x) = $\frac{g(x)}{5x}$. Find h'(3).
d.	The function p is defined by p(x) = f($x^2 - x$). Find the slope of the line tangent to the graph of p at the point where x = -1