AP Calculus AB
Chapter 7 Review

Name______________________________
Date_______________Hour___________

Integral as Net Change (7.1)

1. An object traveling on the x-axis has position x(t) at time t. If the position of the particle at time t=0 is x(0) = 4, and the velocity of the particle is $v(t) = 2(t^2 + 2)^3$, what is the particle's position at time t=6?

2. The acceleration of the particle is given by $a(t) = 3\cos(t)$. Find the velocity of the particle at time t=π if the initial velocity is 4.

3. In a city, the population growth rate between 1990 and 2000 is given by $P(t) = 25000(1.089)^t$ with t measured in years starting at the beginning of 1990. How many people moved to the city from the beginning of 1992 to the beginning of 1998?

Areas (7.2)

4. Find the area of the region enclosed by the functions $y = x^2 + x - 2$ and $y = x + 2$

5. Find the area of the region in the first quadrant enclosed by the x-axis and the functions $y = \sqrt{x}$ and $x = y + 2$

6. Find the area of the region in the first quadrant bounded by the function $y = x^3$, $y - 2x = 4$ and the y-axis.

Volumes (7.3)

7. Find the volume of the solid that would be generated by revolving the region in question 3 around the y-axis from y = 0 to y = 4.

8. The region enclosed by $y = x^2 + 1$ and $y = x + 3$ is revolved around the x-axis. Find the volume of the solid.

9. The region bounded by the y-axis, $y = \sqrt{x}$, and $y = 4$ is rotated around the line y = 6. Find the volume of the solid.

10. The base of a solid is the region bounded by the x-axis and the graph of $y = -3x^2 + 3$. If the cross sections taken perpendicular to the x-axis form equilateral triangles, find the volume of the solid.

11. The base of a solid is the region bounded by the x-axis and the graph of $y = -3x^2 + 3$. If the cross sections taken perpendicular to the x-axis form rectangles with a height that is half of the width, find the volume of the solid.

Previous Material

12. Let *f* be the function $f(x) = 1 + 2x^3$. What is the value of c for which the instantaneous rate of change is equal to the average rate of change over the interval [-1,2]?

13. If f'(x) = sinx, what is the average rate of change of y with respect to x on the closed interval [0,π]?

14. Find the equation for the line tangent to the curve y = x-tanx at $x = \frac{\pi}{4}$

15. Find $\lim_{x\to\infty} \frac{(2x+4)(x-7)}{(x+2)(4x-5)}$

16. Find $\lim_{x\to\infty} \frac{(2x+3)(x+7)}{(x^2+5)(x-6)}$

17. Find $\frac{dy}{dx}$: $y = \frac{5x-1}{4x+2}$

18. Find $\frac{dy}{dx}$: $y = (x^3+1)^2(2x+3)$

Calculator Free Response:

t(hours)	0	1	3	6	8
P(t)	0	94	160	210	402

On thanksgiving, people began to form a line outside of Best Buy waiting for the sales. The store allowed people to begin lining up at midnight, and stopped the line at 8:00 AM. No people were allowed in the line after 8:00 AM. The number of people in line *t* hours after midnight is modeled by a differentiable function, *P(t*), for 0 ≤ t ≤ 8. Values of *P(t)* are given at various times in the table above.

a) Approximate the rate, in people per hour, that people came to stand in line at time t = 7. Show the computations that lead to your answer.

b) Use a trapezoidal sum with four subintervals to estimate the value of $\frac{1}{8}\int_0^8 P(t)dt$. Using correct units, explain the meaning of $\frac{1}{8}\int_0^8 P(t)dt$ in terms of the number of people.

c) At 8:00 AM, the store began to let customers come inside at a rate modeled by the function S, where $S(t) = t^3 - 36t^2 + 420t - 1568$ customers per hour for 8 ≤ t ≤ 12. According to the model, how many people were still waiting outside to come in at 12:00 noon? (Assuming no one came to stand in line after 8:00AM)?

d) According to the model in part *c* at what time were people being let into the store most quickly? Justify your answer.