AP Calculus: Second Semester Final Exam Review

Material Covered

Chapter 4: Section 1 – Section 6
Chapter 5: Section 1 – Section 9
Chapter 6: Section 1, Section 2, Section 4

Things to Study:

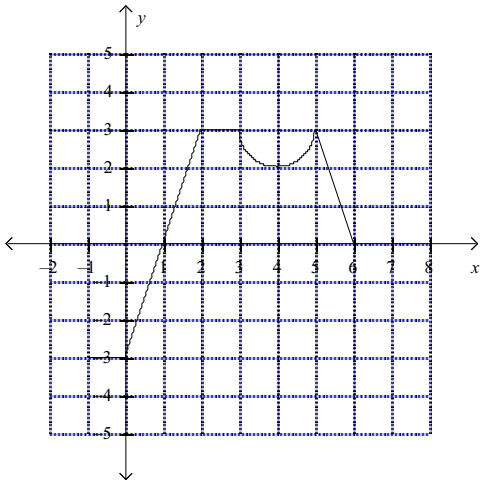
- Homework Assignments
- Quizzes
- Test Reviews from Chapters 4 and 5

The actual exam has 26 multiple choice questions (15 non-calculator and 11 calculator) on the first day and 3 free response questions (all non-calculator) on the second day.

CALCULATOR NOT ALLOWED:

1. $\int (2^{-x} + \frac{1}{x} - 3^{x})dx$

The graph of f(x) is shown below on the closed interval [-1, 6]. Let g be the function defined by g(x) = $\int_0^x f(t)dt$. Use this information for problems #2 – 6.



2. What is g(1) + g'(1) + g''(1)?

3. What is $\int_{-1}^{6} f(t)dt$?

4. Where does the absolute maximum of g(x) occur?

5. Give the x-value of one point of inflection of g(x).

6. Give the intervals where g(x) is concave up.

7. A region R is bounded by the curve $x = y^2 - 3$ and the y-axis. What is the volume generated when region R is rotated about the y-axis?

8. Water is dripping into a vase at a variable rate. The rate, R(t) in cm^3/min., is recorded every 3 minutes for 9 minutes, as shown in the chart below. Using a right Riemann sum with 3 equal intervals, find the approximate average rate at which the water drips into the vase over the 12 minutes.

t	R(t)
0	12
3	15
6	20
9	16

9. Evaluate the integral $\int \sqrt[3]{x^7}\,dx$.

10. Find the average value of $g(x) = 4x^4 - 7$ on the interval [0, 3].

11. Evaluate the integral $\int \sin 2x \cos 2x dx$

12. Evaluate the integral $\int \sin^4 3x \cos 3x dx$

13. Find y = f(x) if $f''(x) = x^{-3/2}$, $f'(4) = 2$, $f(0) = 0$.

14. Find $\frac{dy}{dx}$ if ln(xy) + 5x = 30.

15. Evaluate $\int_{e}^{3e} \frac{2}{3x}\,dx$.

16. Find $\frac{dy}{dx}$ for y = arccos $\frac{x}{2}$.

17. Consider the region bounded by the graphs of $y = x^2$, y = 1 and the y-axis.
    a. Write the integral that represents the volume of the solid generated when the region is revolved about the line x = 2.
    b. Write the integral that represents the volume of the solid generated when the region is revolved about the y-axis.
    c. Write the integral that represents the volume of the solid generated when the region is revolved about the x-axis.

18. Determine the area of the region bounded by the graphs of $y = x^2 - 4x + 3$ and $y = -x^2 + 2x + 3$.

CALCULATOR ALLOWED:

19. Use a(t) = -32 feet per second squared as the acceleration due to gravity. A ball is thrown vertically upward from the ground with an initial velocity of 60 feet per second. For how long is the ball in the air? How high will the ball go?

20. What is the area of the regions between f(x) = 2x cos (2x) and g(x) = -2x sin 2x on the interval [0, π/2].

21. Use the Trapezoidal rule with n = 4 to approximate $\int_2^4 \frac{1}{(x-3)^2}\,dx.$

22. Evaluate the integral $\int_{-2}^{2} |x-1|\,dx$.

23. Find the area of the region bounded by y = 0, x = 2, and y = $x^2\sqrt{\frac{x^3}{8}+1}.$

24. Find y' if y= $\frac{x^4}{4^x}$.

25. Given $\int_1^3 f(x) = 10$, $\int_1^6 f(x) = 15$, $\int_1^6 g(x) = -5$ find the following:

    a. $\int_4^6 f(x)dx$ =

    b. $\int_3^1 f(x)dx$ =

    c. $\int_1^6 [f(x) - g(x)]dx$ =

26. Evaluate $\int_0^2 \frac{e^x}{1+2e^x}$

27. Find the particular solution to the differential equation y' = 2y given the initial condition y(2) = 15.

For #28 – 29, f(x) = cos(πx) and g(x) = $x^3 - 2x$.

28. Find the area of the region bounded by f(x) and g(x).

29. Find the area of the region enclosed by the two graphs that falls below the x-axis.

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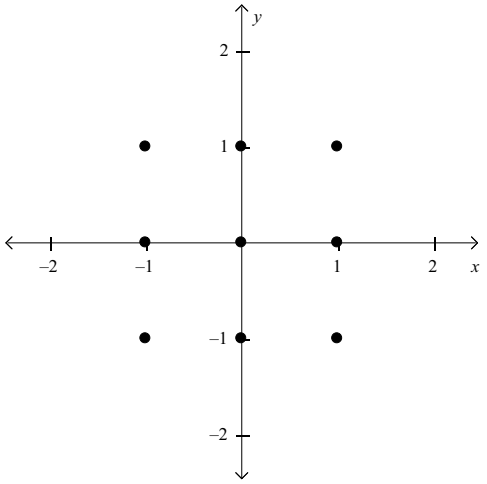
NO CALCULATOR ALLOWED:

1. Let f(x) = $\frac{x}{\sqrt{1+2x^2}}$
   a. Find f'(x).
   b. Find f''(x).
   c. Use a left Riemann sum to approximate $\int_0^2 f(x)dx.$
   d. Use a right Riemann sum to approximate $\int_0^2 f(x)dx.$
   e. Calculate the exact answer for $\int_0^2 f(x)dx.$

2. Consider the differential equation $\frac{dy}{dx} = xy \sin x^2$

a. On the axes provided, sketch a slope field for the given differential equation at the nine points indicated.

b. Find the particular solution y = f(x) to the differential equation with the initial condition f(1) = 0.



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3. Consider the region R bounded by the functions $f(x) = -x^2 + 4x + 2$ and $g(x) = 0$.
   a. Find the area of R.
   b. Find the volume of the solid generated by revolving the region R about the x-axis.
   c. Find the volume of the solid generated by revolving the region R about the line y = 6.