Name_____Period_____Date_____

NON-CALCULATOR SECTION

Vocabulary: **Directions** − Define each word *and* give an example.

1. Definite Integral

2. Mean Value Theorem (for definite integrals)

Short Answer

3. Which is larger, a right-hand rectangular approximation or a left-and rectangular approximation of area? Be specific and explain your answer.

4. Describe the Fundamental Theorem of Calculus for finding the derivative of an integral.

5. How is the area under a curve related to the definite integral of a function? Be specific.

Review

6. A balloon rises at the rate of 8 feet per second from a point on the ground 60 feet from an observer. Find the rate of change of the angle of elevation when the balloon is 25 feet above the ground.

7. Find a value *a* so that the function

$$f(x)=\begin{cases} 3-x^2, & x<-1 \\ ax^2-1, & x\geq -1 \end{cases}$$ is continuous.

Unit Six Problems

Directions: Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

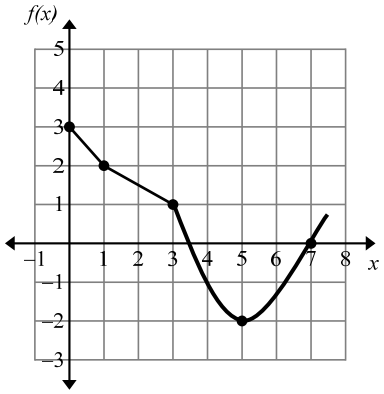
8. Evaluate $\int_0^{\pi/6} \sec^2 x\,dx$.

9. Find $\frac{dy}{dx}$ if $y = \int_0^{2x} \left(t^2 + 5t - 3\right) dt$.

10. Use the Trapezoidal Rule with $n = 4$ to approximate the area of the region in the first quadrant enclosed by the *x*-axis and the graph of the function $y = 9x - x^3$.

11. Use the graph of the integrand and area to evaluate $\int_0^5 \sqrt{25 - x^2}\,dx$. Sketch the graph and show all work involved in finding the answer.

12. A particle moves along a coordinate axis. Its position at time *t* (sec) is $s(t) = \int_0^t f(x)\,dx$ cm, where f is the function whose graph is shown.



a) What is the particle's position at $t = 0$?

b) What is the particle's position at $t = 3$?

c) What is the particle's velocity at $t = 5$?

d) Approximately when is the acceleration zero?

e) At what time during the first 7 seconds does *s* have its largest value?

Multiple Choice Questions: **Circle the best answer**.

13. Suppose that $\int_5^7 f(x)\,dx = 6$ and $\int_5^7 g(x)\,dx = 10$. Which of the following is **not** necessarily true?

(A) $\int_5^7 5g(x)\,dx = 50$

(B) $\int_5^7 \left[f(x) + g(x) \right] dx = 16$

(C) $\int_5^7 \left[f(x)g(x) \right] dx = 60$

(D) $\int_5^7 \left[f(x) - g(x) \right] dx = -4$

(E) $\int_5^7 \left[2f(x) - 3g(x) \right] dx = -18$

14. Evaluate $\int_0^x \sin t\,dt$.

(A) $\sin x$ (B) $-\cos x$ (C) $\cos x$ (D) $\cos x - 1$ (E) $1 - \cos x$

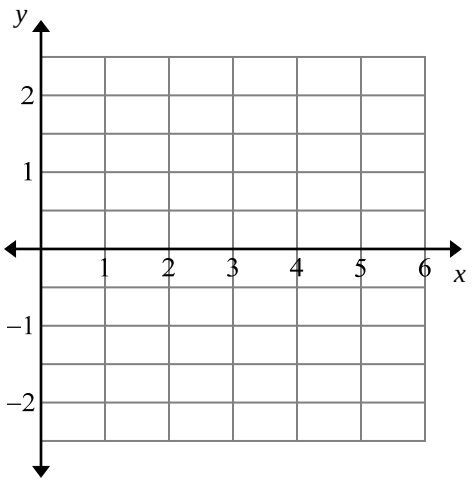
Name_____Period_____Date_____

CALCULATOR SECTION

Directions: Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

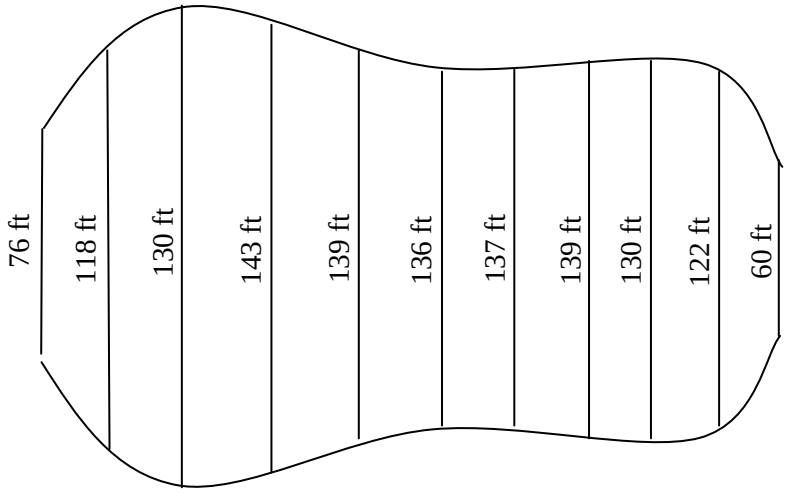
15. What is the average value of $y = x^2\sqrt{x^3+1}$ on the interval $[0,2]$? Write the integral in correct notation used to find the average value and use your calculator to evaluate the answer.

16. Sketch the region R enclosed between the graph of $y = -\frac{1}{2}x^2 + 3x - \frac{5}{2}$ and the *x*-axis for $1 \le x \le 5$. Partition $[1,5]$ into 4 subintervals and show the four rectangles that MRAM uses to approximate the area of *R*.



17. Find $MRAM_4$ for the region described in question 15. Show your work. You may use your calculator for computation only.

18. A meadow has the shape shown, where the measurements shown were taken at 30-foot intervals. Use the Trapezoidal Rule to estimate the area of the meadow. (Figure not drawn to scale.)



Multiple Choice Question: **Circle the best answer**.

19. If $0 \le k < \frac{\pi}{2}$ and the area under the curve $y = \cos x$ from $x = k$ to $x = \frac{\pi}{2}$ is 0.1, then $k \approx$?

(A) 1.471 (B) 1.414 (C) 1.277 (D) 1.120 (E) 0.436