TEST Skip 1(b) see* Review 1 DATE Key

B Chapter 5 NAME

Directions: Show all steps leading to your answers, including any intermediate results obtained using a graphing utility. Use the back of the test or another sheet of paper if necessary.

Work **1.** Consider the region enclosed between the graph of $f(x) = e^x + x^3$ and the x-axis for $1 \le x \le 3.5$.

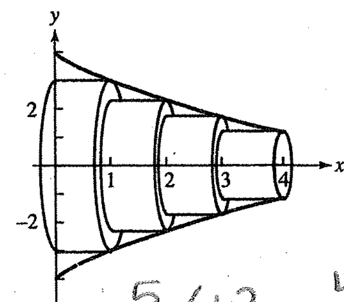
(a) Find MRAM_5, the area estimate obtained using 5 midpoint rectangles.

Skip ~~**(b)**~~ Use MRAM to estimate the area with accuracy of 2 decimal places.

1. (a) ≈ 67
(b) 67.66

Work **2.** A solid is formed by revolving the curve $y = 4 - x^{3/4}$, $0 \le x \le 4$, about the x-axis. Estimate the volume of the solid by partitioning [0, 4] into four subintervals of equal length, slicing the solid with planes perpendicular to the x-axis at the subintervals' right endpoints, and constructing cylinders of height 1 based on cross sections at these points, as shown at the right.

2. ≈ 58.769



3. Use an area to evaluate $\int_{a^2}^{b} 5x\,dx$, where $b > a^2$.

3. $\frac{5}{2}(b^2 - a^4)$

4. Use NINT to evaluate $\int_{1.8}^{3.2} \frac{\cos 2x + 2}{1 + \ln x}\,dx$.

4. ≈ 1.59

5. Suppose that g and h are continuous functions and that $\int_2^6 g(x)\,dx = 5$, $\int_2^6 h(x)\,dx = -1$, and $\int_5^6 h(x)\,dx = 3$. Which of the following must be true?

I. $\int_2^6 \frac{g(x)}{h(x)}\,dx = -5$

II. $\int_5^6 4h(x)\,dx = 12$

III. $\int_2^5 h(x) = -4$

(A) III only (B) I and II (C) I and III
(D) II and III (E) I, II, and III

5. D

Work **6.** Evaluate $\int_1^5 (5 - 2x)\,dx$.

6. -4

Work **7.** Evaluate $\int_{\pi/6}^{\pi/4} \sec^2 x\,dx$ ~~using Part 2 of the~~
* ~~Fundamental Theorem of Calculus~~.

7. $1 - \frac{1}{\sqrt{3}} \approx .423$

NAME

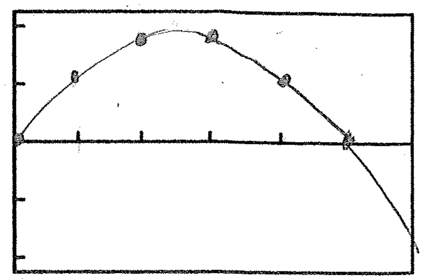
8. **(a)** Graph the function $y = -0.3x^2 + 1.5x$ over the interval [0, 6].

(b) Integrate $y = -0.3x^2 + 1.5x$ over [0, 6].

Total

(c) Find the area of the region between the graph in part (a) and the x-axis.

8. **(a)**



[0, 6] by [−2.25, 2.25]

(b) 5.4

(c) 7.1

9. **(a)** Let $f(x) = 3 - 2x$. Find K so that

$$\int_2^x f(t)\,dt + K = \int_8^x f(t)\,dt.$$

(b) Find $\dfrac{d}{dx}\displaystyle\int_{-1}^x f(t)\,dt.$

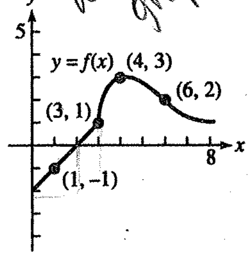
9. **(a)** 42

(b) 3-2x

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

ft/sec

Velocity graph!



(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 $t = 4$?

(d) Approximately when is the acceleration zero?

(e) At what time during the first 7 sec does s have its smallest value?

10. **(a)** 0 ft

(b) -1.5 ft

(c) 3 ft/sec

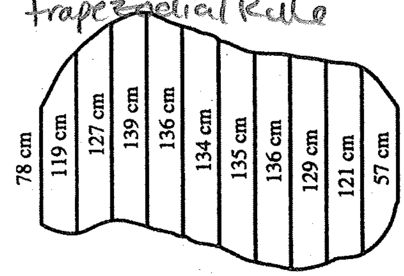
(d) t=4 sec

(e) t=2 sec

11. Use the Trapezoidal Rule with $n = 4$ to approximate the value of $\displaystyle\int_1^2 (x^3 + 1)\,dx$.

11. 4.80

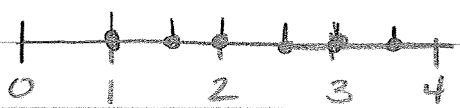
* **12.** A mural has the shape shown, where the measurements shown were taken at 24-cm intervals. Use ~~Simpson's Rule~~ trapezoidial Rule to estimate the area of the mural.



12. 29,844 cm²

Chap 5 Test Form B

1. base length $= \frac{3.5-1}{5} = \frac{2.5}{5} = .5$

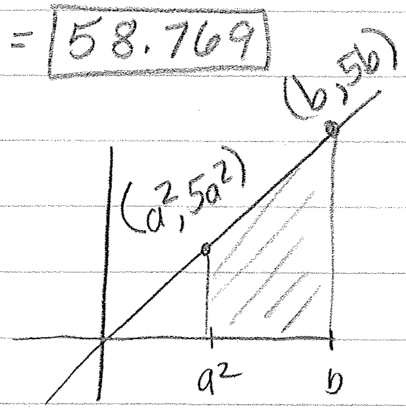


a) $MRAM_5 = .5(5.443 + 11.113 + 20.878 + 36.439 + 60.118)$
$= 66.9955 \approx \underline{\underline{67}}$

2. $V = \pi r^2 h$
$V = \pi(4 - x^{3/4})^2 \cdot 1$
$V = \pi(4-4^{3/4})^2 \cdot 1 + \pi(4-3^{3/4})^2 \cdot 1 + \pi(4-2^{3/4})^2 \cdot 1 + \pi(4-1^{3/4})^2 \cdot 1$
$= 4.312 + 9.299 + 16.883 + 28.274$

$= \boxed{58.769}$

3.



$= \frac{1}{2} \cdot h(b_1 + b_2)$
$= \frac{1}{2}(b - a^2)(5a^2 + 5b)$
$= \frac{1}{2}(5a^2 b + 5b^2 - 5a^4 - 5a^2 b)$
$= \boxed{\frac{1}{2}(5b^2 - 5a^4) \text{ or } \frac{5}{2}(b^2 - a^4)}$

4. Math, #9,
function, x, 1.8, 3.2

$= 1.5889$

5. I. false, No Rule for Quotient

II. True $4 \cdot 3 = 12$

III. True $\int_2^6 h(x) - \int_5^6 h(x)$

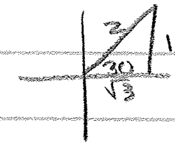
$-1 - 3 = -4$

D

6. $5x - x^2 \Big|_1^5 = 5(5) - 5^2 - (5-1)$

$25 - 25 - 4 = -4$

7. $\tan x \Big|_{\pi/6}^{\pi/4} = \tan \pi/4 - \tan \pi/6$



$= 1 - \frac{1}{\sqrt{3}} \approx .423$

8. a) see graph

b) $\int_0^6 (-.3x^2 + 1.5x)\,dx = \frac{-.3x^3}{3} + \frac{1.5x^2}{2} \Big|_0^6$

$= -\frac{.3(6)^3}{3} + \frac{1.5(6)^2}{2} - 0$

c) Total Area $-21.6 + 27 = 5.4$

$\int_0^5 (-.3x^2 + 1.5x)\,dx + \left| \int_5^6 (-3x^2 + 1.5x)\,dx \right|$

$6.25 + .85 = \boxed{7.1}$

9. a) $\int_2^x f(t)dt + K = -\int_x^8 f(t)dt$

$\int_2^x f(t)dt + \int_x^8 f(t)dt = -K$

$\int_2^8 f(t)dt = -K \rightarrow \int_2^8 (3-2x)dx = -K$

$3x - x^2 \Big|_2^8 = 24 - 64 - (6-4) = -K$

$= -40 - 2 = -K$

$= -42 = -K$

b) $\frac{d}{dx}\int_{-1}^{x} f(t)dt = \boxed{3-2x}$ $\quad K = 42$

10. a) $S(0) = \int_0^0 f(x)dx = 0$ ft

b) $S(3) = \int_0^3 f(x)dx$

$[0,2]$ $A = \frac{1}{2}\cdot 2 \cdot 2 = -2$

$[2,3]$ $A = \frac{1}{2}\cdot 1 \cdot 1 = \frac{1}{2}$

* Need to find net area!

$-2 + \frac{1}{2} = -1.5$

$S(3) = -1.5$

c) Just read the graph when $t=4, y=3$

$\boxed{3 \text{ ft/sec}}$

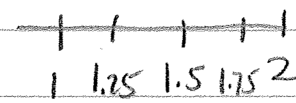
D) acceleration = slope of velocity graph

• $a=0$, when there's a min/max

$t = 4$sec

e) At $t=2$, it switches direction so at $t=2$ "S" would have the smallest value.

11. $h = \dfrac{b-a}{n} = \dfrac{2-1}{4} = \dfrac{1}{4}$



$\dfrac{1/4}{2}\left(2 + 2(2.95) + 2(4.375) + 2(6.359) + 9\right)$

$\frac{1}{8}(38.368) = \boxed{4.80}$

12. $T = \frac{24}{2}\left(78 + 2(119) + 2(127) + 2(139) + 2(136) + 2(134)\right.$
$\left. + 2(135) + 2(136) + 2(129) + 2(121) + 57\right)$

$= 29{,}844\ cm^2$