Math 152

Show Your Work! January 25, 2011 Name _____

Good Luck! TEST #1 A (please print = 1 point)

1. Carefully and completely state **Part I** of the Fundamental Theorem of Calculus.

(5) If

then

2. Use the graph in Fig. 1 to evaluate the following integrals. (2 points each)

(10) $\int_0^5 f(x)\ dx$ = _____ $\int_0^{10} |f(x)|\ dx$ = _____

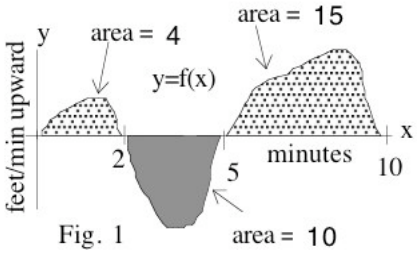


Fig. 1

$\int_2^{10} 1 + f(x)\ dx$ = _____ $\int_5^0 f(x)\ dx$ = _____

Suppose (using this graph) x is time (minutes) and y=f(x) is your upward velocity (feet/minute) on a pole. If you start (x=0) 12 feet up the pole, then how high are you at time x=10? height = _____

3. DEFINE: $\int_a^b f(x)\ dx = \lim_{\rightarrow}$

(4)

4. (a) $\frac{d}{dx}\left(\int_1^{\pi} \sqrt{1+x^3}\ dx\right)$ = _____ (b) $\frac{d}{dx}\left(\int \sqrt{1+x^3}\ dx\right)$ = _____

(8)

(c) $\frac{d}{dx}\left(\int_1^{\sin(x)} \sqrt{1+t^3}\ dt\right)$ = _____ (d) $\int\left(\frac{d}{dx} x^3\ dx\right)$ = _____

5. Use the partition $P=\{1, 3, 4, 5\}$ and c_i = left endpoints to find the value of $V = \sum_{i=1}^{3} f(c_i) \cdot \Delta x_i =$ ____

x	1	2	3	4	5
f(x)	5	7	4	5	6

(4)

6. Quick antiderivatives (No need to show work, just answers) (2 points each.)

(a) $\int 5e^{3x}\ dx =$_____ (b) $\int \frac{4}{x+3}\ dx =$_____ (c) $\int 2\cos(7x)\ dx =$_____

(6)

7. Evaluate these definite integrals. **Show your work**. Give answers to **2 decimal places**. (7 points each.)

(a) $\int_{2.3}^{4.4} \text{INT}(x)\ dx =$_____

(b) $\int_{0}^{2} 6x \cdot \cos(x^2 + 3)\ dx =$ _____

(c) $\int_{1}^{4} \frac{8x}{x^2 + 3}\ dx =$ _____

8. Find the following antiderivatives. (6 points each)

(a) $\int \sqrt{5x+2}\ dx =$ _____

(b) $\int \frac{e^x}{3+e^x}\ dx =$ _____

(c) $\int \frac{x^2+7x+3}{x+2}\ dx =$ _____

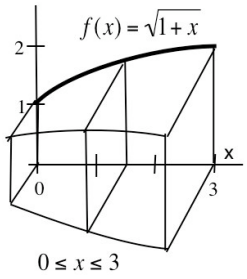
9. Water is flowing into and out of a tank. The flow rate at time t hours is

$v(t) = 6(x-3)(x-5) = 6x^2 - 48x + 90$ gal/hr (v>0 means "into", v<0 means "out of").

At the start (t=0) the tank contains 200 gallons.

(2) (a) When ($0 \le t \le 6$) does the tank contain the most water? _____

(6) (b) How much water is in the tank when t=5? _____

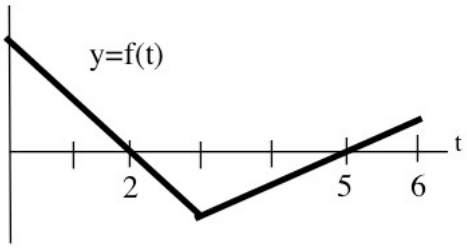


10. What is the volume of the shape in the figure? Each "slice" is a square.
(Show your work.) volume = _____ (number)

(5)

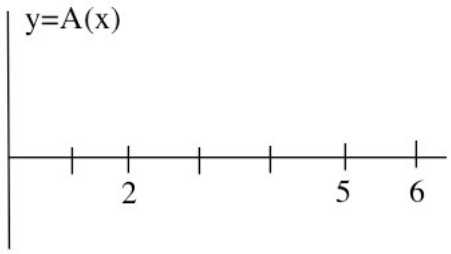
11. The graph of y=f(t) is given in the top graph.

(6) (a) On the bottom graph draw the graph of $A(x) = \int_0^x f(t)\ dt$



(2) (b) A'(3) is {Positive) (Negative) (Zero) (Does Not Exist)

(2) (c) If the t units are "cm" and the f(t) units are "cm/sec",
then the A(x) units are _____



12. Biographies (1 point each)

(a) Name the two co-inventors of calculus: _____ and _____

(b) What was Archimedes wearing when he yelled "Eureka!"? _____

The end! (total points = 103)