Math 152

Show Your Work! November 5, 2008 Name _____

Good Luck! TEST #2 A (please print)

1. Represent the volume of the solid in Fig. 1 as a definite integral, then use the FTC to evaluate it.

volume = $\int$ dx = _____ (number)

(7)(2)

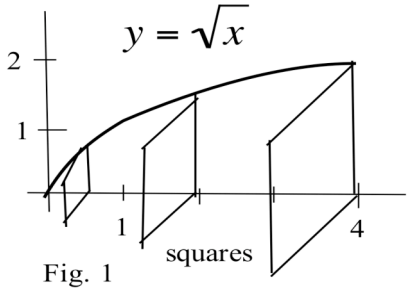


Fig. 1

2. A solid region is formed when the he shaded area in Fig. 2 is revolved around the line y = 3. Represent the volume as a definite integral. **(Do NOT evaluate it.)**

volume = $\int$ dx

(7)

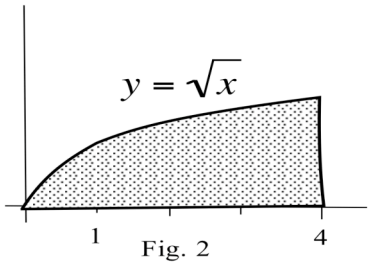


Fig. 2

3. Represent the length of the curve $y = 1 + x^3$ from x=-1 to x=2 as a definite integral and then **use your calculator** to evaluate the integral (2 decimal places).

length = $\int$ dx = _____ (number)

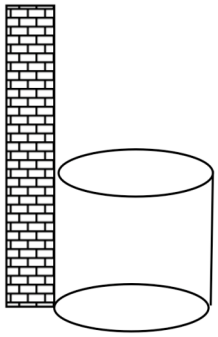
(7)(2)

4. Represent the length of the parametric curve $x(t) = 2 + \cos(t)$ $y(t) = t^3 + 2t$ for $0 \le t \le 3$ as a definite integral. **(Do NOT evaluate it.)**

length = $\int$ dt

(7)

5. A cylindrical tank is 5 feet tall and has a radius of 2 feet. It is filled with a liquid that has a density of 42 pounds per cubic foot. How much work is done to empty the top 3 feet of the liquid over the top of an 11 foot tall wall? **(Show your work! No work = no points.) Work = _____**



(7)

6. A spring has a natural length of 12 inches (rest length), and a 5 pound weight stretches it to a length of 15 inches. Calculate the work done to stretch the spring from a length of 14 inches to a length of 20 inches. (Show your work.) Work = _____

(7)

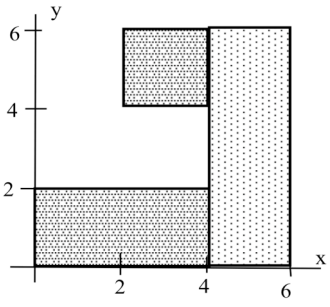
7. A 100 pound weight is being lifted from the ground to the top of a 20 foot tall building using a chain that weighs 4 pounds per foot. You do HALF of the total work if you lift the weight to a height of H feet. H = _____

(7)

8. A strange object is made of three uniformly dense rectangles (see figure). Determine the coordinates of the center of mass of the object.

$\bar{x}$ = _____ $\bar{y}$ = _____

(3)(3)



9. A region is bounded by the curve $y = 1 + x^2$, the x-axis, and the vertical lines x = 0 and x = 2.

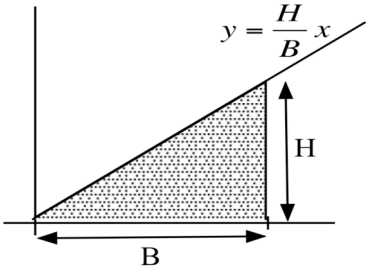
Determine $\bar{x}$ = _____ (Do not calculate $\bar{y}$)

(7)

9. The right triangle with base B and height H is shown in the figure.

Determine $\bar{y}$ _____ (Do not calculate $\bar{x}$)

(7)



10. The units of x are days, the units of f(x) are feet per day, and the units of g(x) are cats. Then the units of

(a) $\int g(x)\ dx$ are _____(2) (b) $\int \frac{f(x)}{g(x)}\ dx$ are _____ (2)

(c) $\int f^2(x)\ dx$ are _____ (2)

11. Write MAPLE commands to (2 each)

(a) Evaluate $\int_1^4 x^3 + \sin(2x)\ dx$: _____

(b) Graph $y = 1 + \sin^2(x)$ for $0 \le x \le 7$: _____

12. (a) $\int \frac{5e^x}{2+e^x}\ dx =$ _____ (b) $\int \cos(x) \cdot \sqrt{3+\sin(x)}\ dx =$ _____

(4)(4)

(c) $\int 6x \cdot \sec^2(x^2)\ dx =$ _____

(4)

13. Biographies (1 each)

(a) Greek who calculated volumes and yelled "eureka": _____

(b) Person who introduced the symbols $\sum$ and i : _____

(c) No home, no steady job but lots of publications and coauthors: _____

The end!