Integrals 2 - Show your work in your notebook!

1. The rate that Lisa walks is recorded at the times shown. Use a RIGHT HAND Riemann Sum with 5 subintervals to estimate the total distance Lisa has walked during the 30 min.

Time (min)	0	8	15	20	24	30
Rate (m/min)	3	6	4	6	5	7

Time (hrs)	Rate gal/hr
0	120
6	100
12	50
18	75
24	40

2. The rate that water flows into a reservoir is recorded at times shown. Use the TRAPEZOIDAL RULE with 4 subintervals to estimate the amount of water to flow into the reservoir during the 24 hour period.

Sketch and shade the area that is represented by each.

3. $\int_{0}^{2} x^2\, dx$

4. $\int_{-1}^{2} -x^2 - 2\, dx$

5. $\int_{0}^{4} \sqrt{x}\, dx$

6. $\int_{0}^{2} 1 - x\, dx$

Sketch the region indicated by the integral and use GEOMETRY to find the area.

7. $\int_{0}^{3} 4\, dx$

8. $\int_{0}^{8} 8 - x\, dx$

9. Given that $\int_{0}^{3} f(x)\, dx = 4$ and $\int_{3}^{6} f(x)\, dx = -1$

   a. $\int_{0}^{6} f(x)\, dx =$

   b. $\int_{6}^{3} f(x)\, dx =$

   c. $\int_{3}^{3} f(x)\, dx =$

   d. $\int_{3}^{6} -5f(x)\, dx =$

10. Given that $\int_{-1}^{1} f(x)\, dx = 1$ and $\int_{0}^{1} f(x)\, dx = 5$

    a. $\int_{-1}^{0} f(x)\, dx =$

    b. $\int_{0}^{1} f(x)\, dx - \int_{-1}^{0} f(x)\, dx =$

    c. $\int_{-1}^{0} 3f(x)\, dx =$

    d. $\int_{1}^{0} -3f(x)\, dx =$

11.

   a. $\int_{0}^{1} -f(x)\, dx =$

   b. $\int_{0}^{7} f(x)\, dx =$

   c. $\int_{0}^{11} f(x)\, dx =$

   d. $\int_{3}^{4} 3f(x)\, dx =$

   e. $\int_{5}^{11} f(x)\, dx =$

   f. $\int_{4}^{10} f(x)\, dx =$

(3, 2) (4, 2) (11, 1) (8, −2)
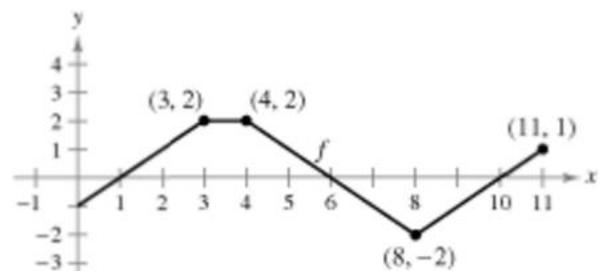
12. Evaluate each definite integral. Check your answer using your graphing calculator.

a. $\displaystyle\int_0^{\pi} \cos x \, dx$

b. $\displaystyle\int_0^1 2x \, dx$

c. $\displaystyle\int_{-1}^0 x - 2 \, dx$

d. $\displaystyle\int_2^5 -3x + 4 \, dx$

e. $\displaystyle\int_1^3 \left(3x^2 + 5x - 4\right) dx$

f. $\displaystyle\int_{-1}^1 t^2 - 2 \, dt$

g. $\displaystyle\int_1^4 \frac{u-2}{\sqrt{u}} \, du$

h. $\displaystyle\int_0^{\pi} \left(1 + \sin x\right) dx$

i. $\displaystyle\int_0^{\pi/6} \sec^2 x \, dx$

j. $\displaystyle\int_0^{\pi/4} 4 \sec x \tan x \, dx$

13. Integrate each.

a. $\displaystyle\int \frac{1}{\sqrt[3]{x}} \, dx$

b. $\displaystyle\int x^2 (x-4) \, dx$

c. $\displaystyle\int \sec x \tan x - \csc^2 x \, dx$

d. $\displaystyle\int \frac{x+2}{\sqrt{x}} \, dx$

14. Find the AVERAGE VALUE of each function over the given interval.

a. $f(x) = \sin x$; $[0, \pi]$

b. $f(x) = -x + 3$; $[-1, 2]$

c. $f(x) = \dfrac{1}{\sqrt{x}}$; $[0, 4]$

Answers
1. 168 m
2. 1830 gal

3.

4.

5.

6.

7.

$\int_0^3 4 \, dx = 12$

$\int_0^8 8 - x \, dx = \frac{1}{2}(8)(8) = 32$

8.
9. –
   a. 3
   b. 1
   c. 0
   d. 5

10. –
   a. -4
   b. 1
   c. -12
   d. 15

11. –
   a. ½
   b. 5
   c. 2
   d. 6
   e. -3

12. –
   a. 0
   b. 1
   c. -5/2
   d. -39/2
   e. 38
   f. -10/3
   g. 2/3
   h. $2 + \pi$
   i. $\dfrac{\sqrt{3}}{3}$
   j. $4\sqrt{2} - 4$

   f. -2
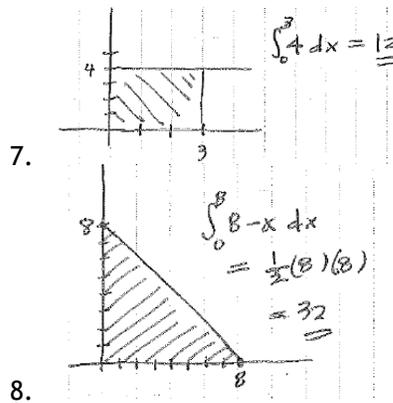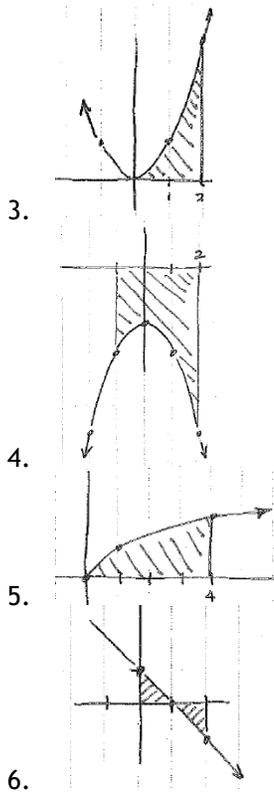
13. –
   a. $\dfrac{3}{2} x^{\frac{2}{3}} + C$
   b. $\dfrac{1}{4} x^4 - 2x^2 + C$
   c. $\sec x + \cot x + C$
   d. $\dfrac{2}{3} x^{3/2} + 4x^{1/2} + C$

14. –
   a. $\dfrac{2}{\pi}$
   b. 5/2
   c. 1