PROBLEM SHEET 4 – Integration

Some problems on this sheet are taken from *Calculus; Single Variable*, second edition by Hughes-Hallett, Gleason, et al. New York, John Wiley & Sons, 1998.

1. Find the most general antiderivative of each function below:

   a. $y = 3x^{2/3} + x^{1/3} - 7$

   b. $y = \sqrt{x}(3x - 8)$

   c. $y = \sin(2x) - 6$

   d. $y = -10\csc^2(x)$

2. Make a table of values for the following function for $x = 0, 0.5, 1.0, 1.5, 2.0$: $A(x) = \int_0^x \sqrt{t^4 + 1}\,dt$

   (Use the TI-CAS integral function to evaluate the definite integral for each value.)

3. Use the TI-CAS program ACCUMLAT to find values for the accumulation function and then plot them on a graph. Copy the graph onto paper and try to write a functional expression for the values plotted.

   a. $f(t) = \dfrac{1}{2t}$ and $1 \le x \le 5$

   b. $f(t) = e^t$ and $0 \le x \le 5$

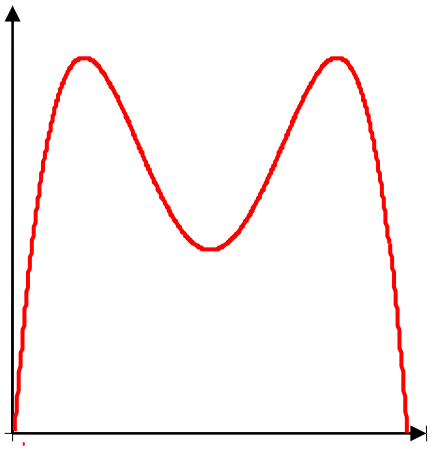
4. The graph of the derivative F' of some function F is given. Let $F(20) = 150$.

   a. At what value for x will F attain its maximum.

   b. Estimate the area under the curve of F' from $x = 20$ to $x = 50$.

   c. Estimate the maximum value attained by F.

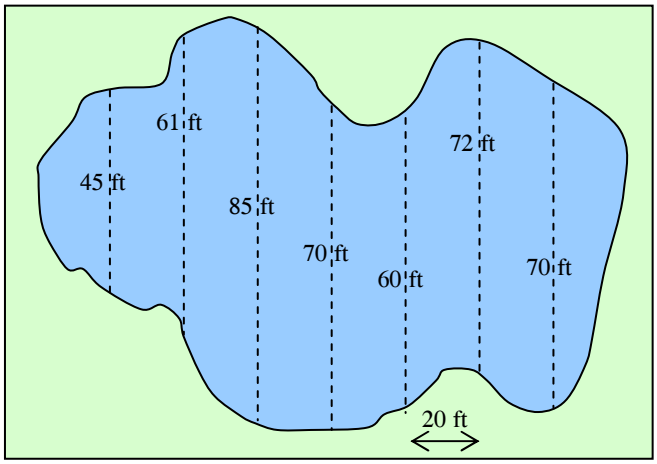
5. At right is a graph of $f(t)$. Draw a graph of $A(x)$ where $A(x) = \int_0^x f(t)dt$.



6. $\frac{d}{dx}\left[\int_{2x}^{1} \cos(t^2)dt\right] =$

7. $\frac{d}{dx}\left[\int_{1}^{x^2} \frac{dt}{1+\sqrt{1-t}}\right] =$

8. To estimate the surface of a pond, a surveyor takes several measurements, as shown in the figure. Estimate the surface area of the pond using the Trapezoidal Rule.



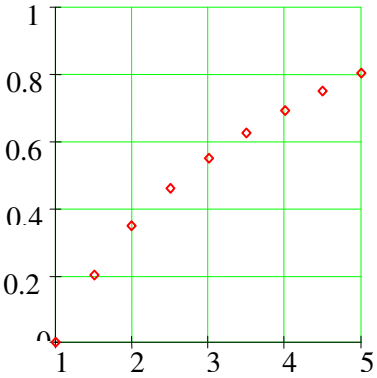
Answers

1.

2.

x	0	0.5	1	1.5	2
A	0	0.503	1.089	2.031	3.654

3. a.



4. a. $x = 50$

b. 360

c. 510

5.

6. $-2\cos(4x^2)$

7. $\dfrac{2x}{1+\sqrt{1-x^2}}$

8. 9260 ft^2