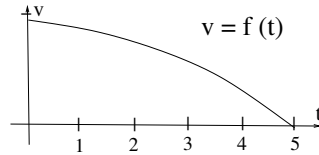


Name: _____

Section: _____

IMPORTANT: All answers must include either supporting work or an explanation of your reasoning. These elements are considered part of the answer and will be graded.

1. (15 pts) A car is going 30 meters per second when the driver puts on the brakes, bringing the car to a stop in 5 seconds. The car's velocity, $v = f(t)$ in meters/second, is measured at one-second intervals with the results given by the following table.



t	f(t)
0	30
1	25
2	20
3	10
4	5
5	0

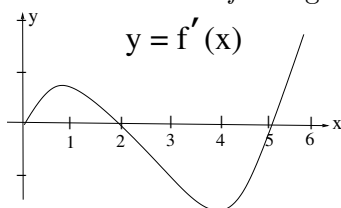
(a) Estimate $\int_0^5 f(t) dt$ using a Left-hand (Riemann) sum with $\Delta t = 1$. Write out the terms of the Left-hand sum.

(b) Estimate $\int_0^5 f(t) dt$ using a Right-hand (Riemann) sum with $\Delta t = 1$. Write out the terms of the Right-hand sum.

(c) Interpret (a) and (b) in terms of how far the car travels from the time the brakes are applied until it stops?

2. (5 pts) Find $\frac{d}{dx} \left(\int_3^x t^2 \sqrt{t^2 + 1} dt \right)$

3. (15 pts) The graph of f' and a table of values for f are given below. Use the table of values for f to



x	f(x)
0	15
1	11
2	13
3	11
4	6
5	2

determine the following: centerline

(a) Determine $\int_0^5 f'(x) dx$

- (b) What is the area of the region bounded by the x -axis and the graph of f' between $x = 2$ and $x = 5$?

- (c) Determine intervals between $x = 0$ and $x = 6$ on which $f(x)$ is concave up.

4. (10 pts) Solve the initial value problem $\frac{dy}{dx} = \sin x + x^4$, $y(0) = 2/3$.

5. (5 pts) (a) Suppose you know that $\int_{-1}^6 f(x) dx = 3$ and $\int_6^3 f(x) dx = 4$. What is $\int_{-1}^3 f(x) dx$? Show your reasoning.

6. (10 pts) On the surface of the moon, an object is thrown vertically upward from a height of 8 feet with an initial velocity of 49 ft/sec. Assume the gravity acceleration on the moon is -7 ft/sec^2 .

(a) Find the velocity function and the height function.

(b) What is the maximum height and when does the object reach it?

7. (10 pts) Evaluate $\int \frac{x^3 + 1}{x\sqrt{x}} dx$

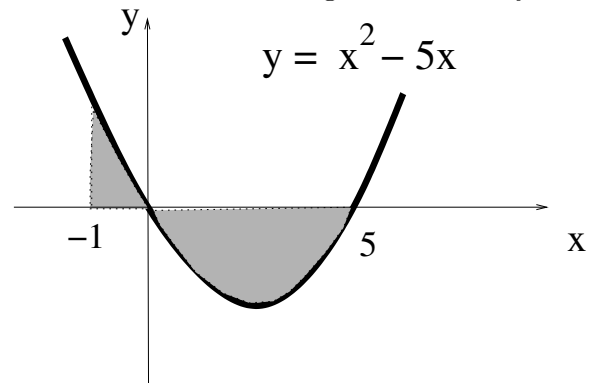
8. (10 pts) Evaluate using the Fundamental Theorem: $\int_1^4 \frac{x}{2} + \frac{3}{x} dx$

9. (10 pts) Suppose the rate at which ice in a skating pond is melting is given by $\frac{dV}{dt} = 6t + 4$, where V is the volume of the ice in cubic feet, and t is the time in minutes.

(a) Write a definite integral which represents the amount of ice that has melted in the first 6 minutes.

(b) Evaluate the definite integral in part (a) using the Fundamental Theorem.

10. (10 pts) Use the Fundamental Theorem to find the exact area of the shaded region bounded by the curve



$y = x^2 - 5x$, the x -axis, $x = -1$ and $x = 5$. centerline