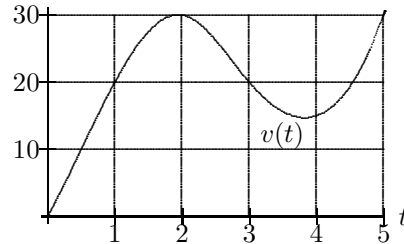


6.(15) The graph shown is that of the velocity of an object (in meters/second)

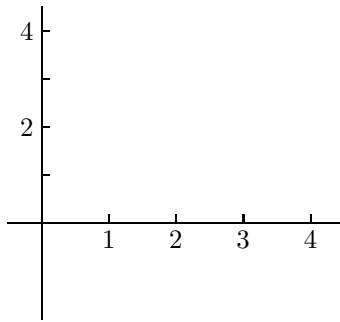


a) Find an upper and lower estimate of the total distance traveled from $t = 0$ to $t = 5$ seconds. Show your work.

b) At what time(s) is the acceleration zero? Justify.

7.(10) A function is defined for all x has the following properties:

f is increasing, f is concave down, $f(2) = 3$, $f'(2) = 2$.



a) Sketch a possible graph for f .

b) How many roots must f have? Justify your answer. c) Write a sentence or two giving a mathematically-based justification of the statement: one root of f occurs between $x = 0$ and $x = 4$.

8.(15) a) Use your calculator to estimate the value of $\int_{-1}^5 \frac{1}{\sqrt{x^2+1}} dx$ using 45 subintervals and left rectangles. Give 4 decimal places. Tell what you type on the command line of your calculator. (Simply typing “rsum()” is not a sufficient answer; use the “sum” feature.)

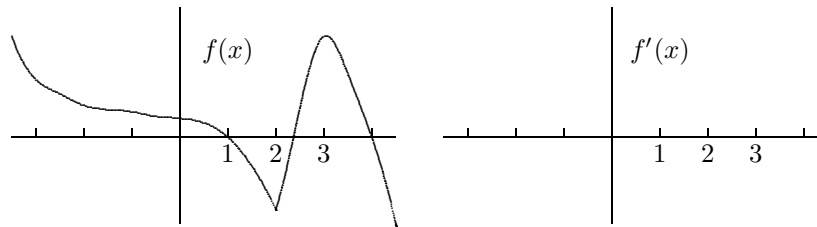
b) Can you tell, from what we have done in the course so far whether your estimate in (a) is an overestimate or underestimate? Why or why not?

c) Same as question (b) but for the integral $\int_0^5 \frac{1}{\sqrt{x^2+1}} dx$

1.(10 points) Let $f(x) = \frac{e^x}{x+1}$. Write out the expression that would approximate $\int_1^3 f(x) dx$ by using a right Riemann sum of three terms. Your answer should be all numbers (and e 's), ready to be evaluated on a calculator—but do NOT evaluate.

2.(10) Use the definition of derivative to compute $f'(x)$ for $f(x) = \sqrt{x+3}$.

3.(15) For f in the figure tell the interval(s) on which [write interval in form $a < x < b$]



- a) f is positive Ans: _____
- b) f' is positive Ans: _____
- c) f'' is positive Ans: _____
- d) Sketch the graph of the derivative of the function.

4.(10) Let $v(t)$ denote the velocity of an object at time t . Assume that $v(t)$ is continuous on $[a, b]$. Use the definition of the integral to explain why $\int_a^b v(t) dt$ can be thought of as a distance traveled (or a change in position).

5.(15) Given the following data about a function f .

x	3	3.5	4	4.5	5	5.5	6
$f(x)$	10	8	7	4	2	0	-1

—SHOW YOUR WORK—

- a) Estimate $f'(4.25)$ and $f'(4.75)$.
- b) Estimate the rate of change of f' at $x = 4.5$ (Read the question again.)
- c) Find, approximately, an equation of the tangent line at $x = 4.5$.
- d) Use the tangent line (approximation) from (c) to estimate $f(4.75)$.
- e) Estimate the derivative of the inverse function f^{-1} at 2.