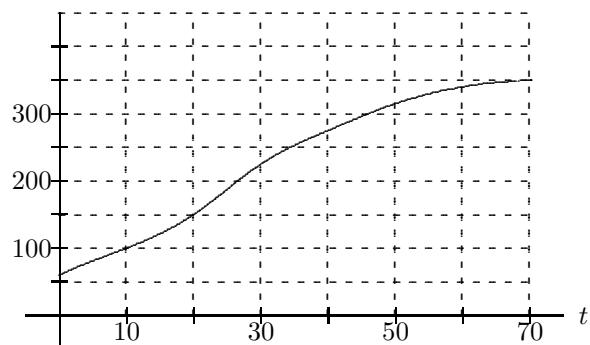


10. Consider the curve in the figure.



- Give a left Riemann sum of three terms for $\int_{10}^{70} f(t) dt$
- Sketch the estimate in (a) on the figure.
- Give a right Riemann sum of three terms for $\int_{10}^{70} f(t) dt$
- Based on your answers in (a) and (c), what is your best guess for $\int_{10}^{70} f(t) dt$

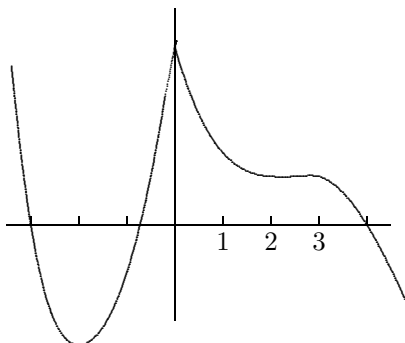
7. You will see later in the semester that the derivative of $\frac{x-3}{x+2}$ is the function $\frac{5}{(x+2)^2}$.

a) Use this fact to compute one of the following integrals (exactly):

$$\int_1^4 \frac{5}{(x+2)^2} dx \quad \int_2^6 \frac{x-3}{x+2} dx$$

b) Tell why you are able to compute the one but not the other at this time.

8. Give intervals for x in which $f(x)$, $f'(x)$, and $f''(x)$ have values indicated.

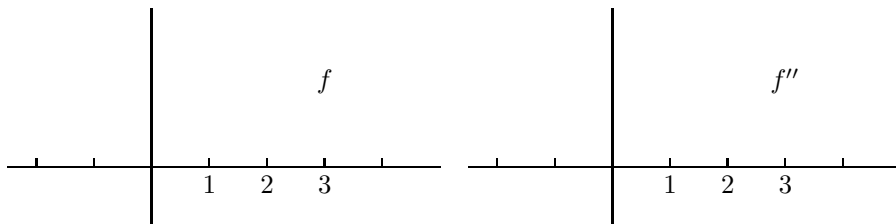
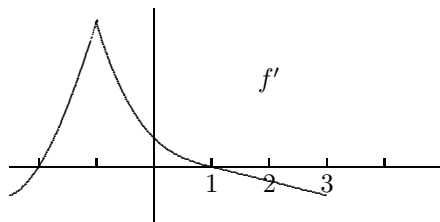


$f > 0$ for x satisfying:

$f' > 0$ for x satisfying:

$f'' > 0$ for x satisfying:

9. Sketch the graph of f and f'' given the graph of the derivative f' .



(each problem is worth 10 points)

1. Define the following objects:

a) Derivative $f'(a) =$ b) Definite integral $\int_a^b f(x) dx$ 2.a) Use difference quotients (as in the definition of f') to approximate $f'(1)$ for $f(x) = \sqrt{8x+1}$ accurate to 1 decimal place. Tell explicitly the numbers used in your calculation.

b) How do you know your estimate is accurate to one decimal place?

3. Let $f(T)$ be the time, in minutes, that it takes for an oven to heat up to T ° Fahrenheita) What are the units of $f'(T)$?b) What is the sign of $f'(T)$?c) What is the meaning (in words) of $f(300) = 10$ d) What is the meaning (in words) of $f'(300) = 0.1$ 4. A mudslide in California is pouring mud into a valley at a rate of $h(t)$ ft³/hr where t is the number of hours since the mudslide began. Suppose that $\int_0^{20} h(t) dt = 2,000,000$. Explain in practical terms what this equation means.

5. The table gives the windchill factor (° F) as a function of the windspeed (in mph) when the air temperature is 20° F.

windspeed (mph)	5	10	15	20	25
windchill	16	3	-5	-10	-15

a) Give an approximation (including units) of the derivative of windchill with respect to windspeed when the air temperature is 20° and the windspeed is 10 mph.

b) Explain in words what the derivative in (a) means.

6. Sketch the graph of $g(x)$ —assuming that $g(0) = 0$.