

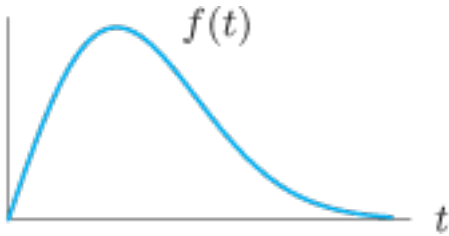
## Homework 16

§6.4#5, 9, 17, 31, 35, 37, **24, 36**

§6.1#3, 9, 17, 23, 29, **8, 12, 18**

§6.4 #5. Give an expression for the function  $f(x)$  with the given properties  $f'(x) = \frac{\sin(x)}{x}$  and  $f(1) = 5$

§6.4 #9. Let  $F(x) = \int_0^x f(t)dt$ . Graph  $F(x)$  as a function of  $x$ .



§6.4 #17. Find the intervals where the graph of  $F(x) = \int_0^x e^{-t^2} dt$  is concave up and concave down.

§6.4 #31. Let  $w(t) = \int_0^t q(x)dx$ . Assume  $q$  is a function with negative first and second derivatives.

Estimate  $w(0.4)$ . Is your answer an underestimate or overestimate?

$x$	0	0.1	0.2	0.3	0.4	0.5
$q(x)$	5.3	5.2	4.9	4.5	3.9	3.1

§6.4 #35. Calculate the derivative  $\frac{d}{dx} \int_0^{x^2} \ln(1+t^2)dt$

§6.4 #37. Calculate the derivative  $\frac{d}{dt} \int_{2t}^4 \sin(\sqrt{x})dx$

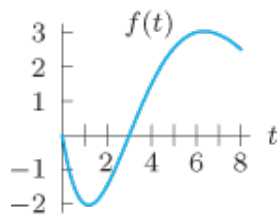
§6.4 #24. Let  $g(x) = \int_0^x f(t)dt$  where  $f(t)$  is graphed below. Find

a)  $g(0)$

b)  $g'(1)$

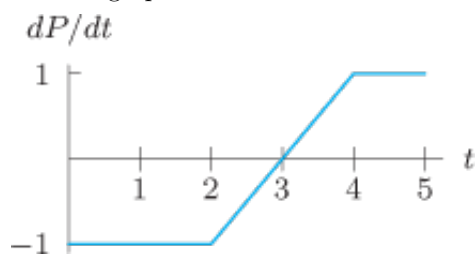
c) The interval where  $g$  is concave up

d) The value of  $x$  where  $g$  takes its maximum on the interval  $0 \leq x \leq 8$

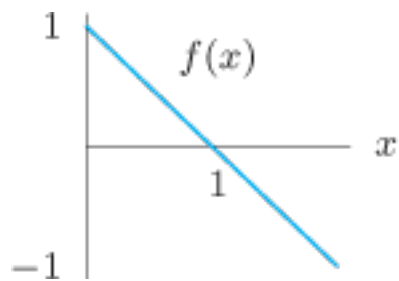


§6.4 #36. Calculate the derivative  $\frac{d}{dt} \int_1^{\sin(t)} \cos(x^2) dx$

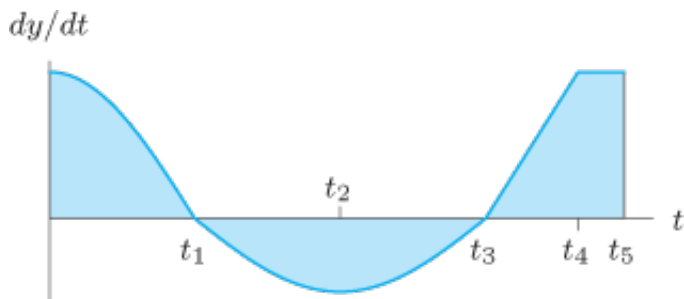
§6.1 #3. Use the graph and the fact that  $P = 2$  when  $t = 0$  to find values of  $P$  when  $t = 1, 2, 3, 4, 5$ .



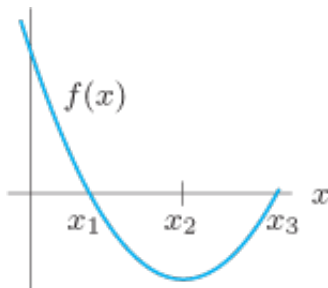
§6.1 #9. Sketch two functions  $F$  such that  $F' = f$ . In one case let  $F(0) = 0$  and in the other let  $F(0) = 1$ .



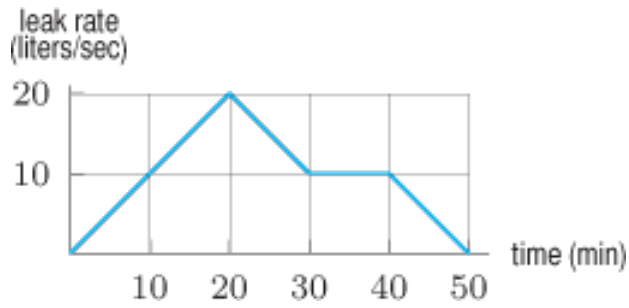
§6.1 #17. The graph of  $\frac{dy}{dt}$  against  $t$  is in the graph. The three shaded regions each have area 2. If  $y = 0$  when  $t = 0$ , draw the graph of  $y$  as a function of  $t$ , labeling the known  $y$ -values, minima and maxima, and inflection points. Mark  $t_1$  through  $t_5$  on the  $t$ -axis.



§6.1 #23. Sketch two functions  $F$  with  $F' = f$ . In one, let  $F(0) = 0$ ; in the other, let  $F(0) = 1$ . Mark  $x_1$ ,  $x_2$ , and  $x_3$  on the  $x$ -axis of your graph. Identify local maxima, minima, and inflection points of  $F(x)$ . The graph of  $f$  is shown below.



§6.1 #29. The graph records the spillage rate at a toxic waste treatment plant over the 50 minutes it took to plug a leak.

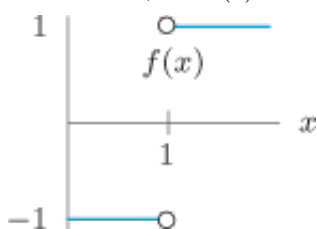


a) Complete the table for the total quantity spilled in liters in time  $t$  minutes since the spill started.

Time $t$ (min)	0	10	20	30	40	50
Quantity (liters)	0					

b) Graph the total quantity leaked against time for the entire 50min. Label the axes and include units.

§6.1 #8. Given the graph of  $f(x)$  below, sketch two functions  $F$  such that  $F' = f$ . In one case let  $F(0) = 0$  and in the other, let  $F(0) = 1$ .



§6.1 #12. Let  $F(x)$  be an antiderivative of  $f(x)$ .

a) If  $\int_2^5 f(x)dx = 4$  and  $F(5) = 10$ , find  $F(2)$ .

b) If  $\int_0^{100} f(x)dx = 0$ , what is the relationship between  $F(100)$  and  $F(0)$ ?

§6.1 #18. The graph of  $\frac{dy}{dt}$  is given below. The three shaded regions each have area 2. If  $y = 0$  when  $t = 0$ , draw the graph of  $y$  as a function of  $t$  labeling the known  $y$ -values, maxima and minima, and inflection points. Mark  $t_1, \dots, t_5$  on the  $t$  axis.

