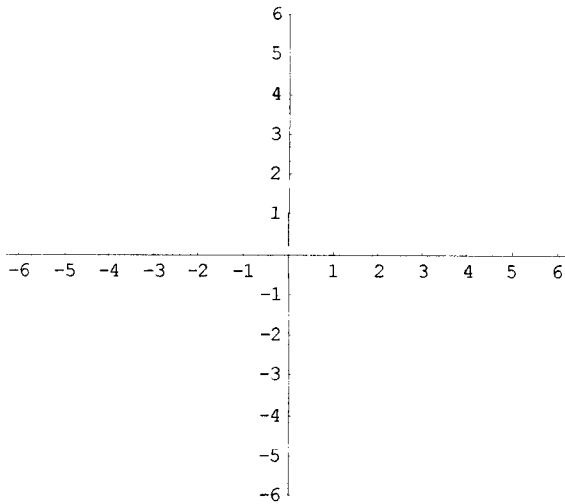


Show all work.

1. (a) Find the slope and y -intercept of the line $9x + 4y = 20$ and graph this line.



- (b) Let $f(x) = 3x^2 + 6$. Find the equation of the line tangent to $f(x)$ when $x = 3$.

2. The Gross National Product, G , of Iceland was 6 billion dollars in 1998. Give a formula for G (in billions of dollars) t years 1998 if G increases by

(a) 3% per year.

(b) .2 billion dollars per year.

3. The antidepressant fluoxetine (or Prozac) has a half-life of 3 days. What percentage of a dose remains in the body after

(a) one day?

(b) one week?

4. In t seconds, a particle moves S meters in a straight line, where $S = t^2 - t$.

(a) Find the average velocity $\frac{S(2+h) - S(2)}{h}$ between $t = 2$ and $t = 2 + h$, ($h \neq 0$).

(b) Use part (a) to find the average velocity between $t = 2$ and $t = 2.1$.

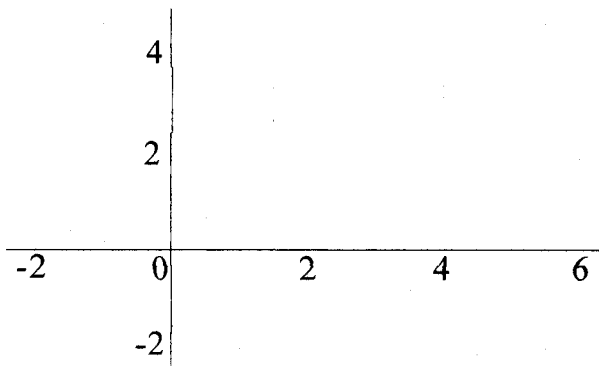
(c) Use part (a) to find the instantaneous velocity at $t = 2$.

5. Sketch the graph of a function on the interval $[-2, 6]$ with the following properties.

(a) $f(-2) = 4$, $f(2) = 1$, $f(6) = -2$

(b) $f'(x) < 0$ for all x in $(-2, 6)$

(c) $f''(x) < 0$ for $-2 < x < 2$, $f''(x) > 0$ for $2 < x < 6$



In problems 7 and 8, use the rules for differentiation to find the derivative of each of the given functions.

6. (a) $f(x) = 5x^2 + \frac{1}{x^2}$

(b) $g(x) = e^{\sin 2x}$

7. (a) $f(x) = x^3 \ln x$

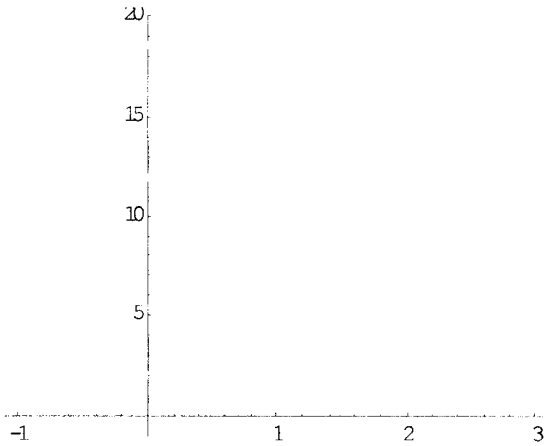
(b) $g(x) = \frac{5-3x}{5+3x}$

8. Consider the function $f(x) = 6x^3 - 9x^2 + 12x + 6$ on the interval $[0, 3]$.

(a) Find the critical points and inflection points for $f(x)$, and

use this information to graph $y = f(x)$ on the interval $[0, 3]$.

(b) Find the global maximum and minimum values for $f(x)$ on the interval $[0, 3]$.



9. The velocity of a rocket shot straight up into the air in ft/sec is $v(t) = 80t^2$, $t \geq 0$.

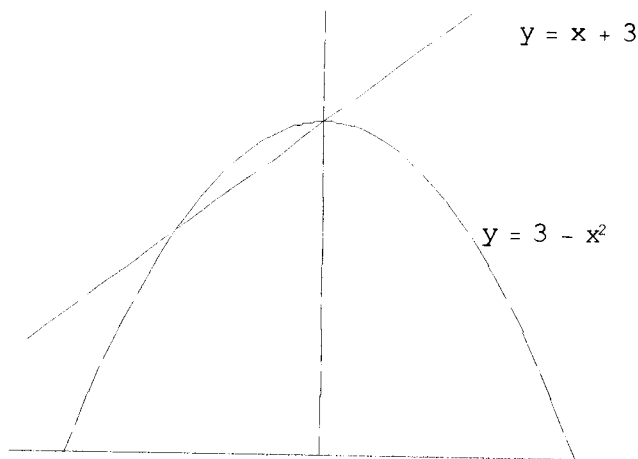
(a) Finish the table below for $t = 0$ to $t = 2$ where $\Delta t = .5$.

Time (sec)	0	.5	1	1.5	2
Velocity (ft/sec)	0				

(b) Use the table to give a lower estimate L and an upper estimate U for the total distance traveled in the interval $[0, 2]$.

(c) Use the definite integral to find the exact distance traveled in the interval $[0, 2]$.

10. Find the area of the region between the graphs of $y = x + 3$ and $y = 3 - x^2$.



11. (a) Find the average value of $f(x) = \frac{1}{x^2}$ on the interval $[1, 3]$.

(b) Find a value for x in the interval $[1, 3]$ for which $f(x) = f_{\text{avg}}$.

(c) Use part (b) to construct a rectangle on with base $[1, 3]$ whose area equals $\int_1^3 f(x) dx$.

12. Evaluate each of the following definite or indefinite integrals.

(a) $\int \left(2y + \frac{2}{y} - e^{2y} \right) dy$

(b) $\int x\sqrt{1-x^2} dx$

(c) $\int \frac{e^x}{13+e^x} dx$

(d) $\int_1^2 \sin(2x) dx$