1. Find the limit.
   (a) $\lim_{t\to 0} \dfrac{\sin^2 3t}{t^2}$
   (b) $\lim_{x\to 0} \dfrac{\sin 3x}{\sin 5x}$
   (c) $\lim_{x\to 0} \dfrac{(\cos x - 1)\sin 3x}{x^2}$
   (d) $\lim_{x\to -2} \dfrac{\tan \pi x}{x+2}$

2. Differentiate the function.
   (a) $s(t) = t^8 + 6t^7 - 18t^2 + 2t$
   (b) $x(t) = \sqrt[3]{t} - \dfrac{1}{\sqrt[3]{t}}$
   (c) $f(x) = (3x^3 - 2x^2 + 1)^6$
   (d) $G(x) = \dfrac{3x-7}{x^2+5x-4}$
   (e) $f(x) = \sqrt{x^3 - 3x^2 + 3x - 1}$
   (f) $g(\theta) = (1 + \cos^2\theta)^3$
   (g) $f(x) = \cos\sqrt{x}$
   (h) $f(x) = \left(\dfrac{x^4-1}{x^4+1}\right)^3$
   (i) $f(x) = \dfrac{2x+1}{\sqrt{x^2+3}}$
   (j) $f(x) = (x^6 + 4x^5 - 11)^5 (2 + x^8)^7$

3. Functions f and g satisfy the properties as shown in the table. Find the indicated quantity.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	-3	3	1	1
2	0	3	-5	10
3	2	5	0	4

   (a) $h'(1)$, if $h(x) = f(g(x))$
   (b) $z'(2)$, if $z(x) = [f(2x-1)]^4$
   (c) $G'(1)$, if $G(x) = \left[x^2 - g(2x)\right]^3$

4. For what values of x does the graph of $f(x) = 2x^3 - 3x^2 - 6x + 87$ have a horizontal tangent?

5. Find the equation of the tangent line to the curve $y = x\sqrt{1+x^2}$ at the point where $x = 1$.

6. Find $\dfrac{dy}{dx}$ for the equation $\cos(x-y) = y\sin x$.

7. Find $\dfrac{dx}{dy}$ for the equation $y^4 + x^2y^2 + yx^4 = y + 1$.

8. Find the slope of the tangent line to the curve $2(x^2+y^2)^2 = 25(x^2-y^2)$ at the point (3,1).