

Evaluate each limit.

1. $\lim_{x \rightarrow 0} \left(4^x + \frac{1}{4^x} \right)$

7. $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{x^2}$

2. $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$

8. $\lim_{x \rightarrow 0} \left(x - \frac{\sin 3x}{x} \right)$

3. $\lim_{x \rightarrow 0} \frac{3x^3 - 2x}{2x^2 - 3x}$

Find the derivative of each function.

9. $f(x) = x^6$

10. $f(x) = 4x^3$

11. $f(x) = 3x + 4x^2$

12. $f(x) = (x^4 - 3x^2)(5x^3)$

13. $f(x) = \sqrt{2x^3 - 6x}$

14. $f(x) = 4x + \frac{(x-1)^2}{2x}$

Find the equation of the tangent line to the graph of each function at the given point. Leave your answer in point-slope form.

1. $f(x) = x^2 + 5x - 2$; (1,4)

3. $f(x) = 2x^2 - 9x + 5$; (2,-5)

2. $f(x) = -x^2 + 6x + 11$; (-2,-5)

4. $f(x) = 3x^2 + 4x - 2$; (1,5)

Find the critical points for each function. Then determine whether each point is a *minimum*, *maximum* or *inflection point*. Justify each answer.

1. $f(x) = 4 + x - x^2$

3. $f(x) = x^3 + 3x^2 - 4$

2. $f(x) = x^3 - 6x^2 + 9x$

4. $f(x) = 2x^3 - 5$