Normal Lines

For each problem, find the equation of the line normal to the function at the given point. If the normal line is a vertical line, indicate so. Otherwise, your answer should be in slope-intercept form.

1) \( y = x^3 - x^2 - 2 \) at \((1, -2)\)

2) \( y = \frac{1}{x - 4} \) at \((5, 1)\)

3) \( y = -x^3 + 15x^2 - 72x + 110 \) at \((4, -2)\)

4) \( y = \frac{2}{x - 3} \) at \((5, 1)\)

5) \( y = \frac{3}{x + 2} \) at \((4, \frac{1}{2})\)

6) \( y = (2x - 8)^\frac{1}{3} \) at \((0, -2)\)

7) \( y = \ln (x + 4) \) at \((-3, 0)\)

8) \( y = -\sin (2x) \) at \((-\frac{\pi}{2}, 0)\)
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2) \( y = \frac{1}{x - 4} \) at \((5, 1)\)

3) \( y = -x^3 + 15x^2 - 72x + 110 \) at \((4, -2)\)
   Normal line is vertical line at \(x = 4\)

4) \( y = \frac{2}{x - 3} \) at \((5, 1)\)
   \(y = 2x - 9\)

5) \( y = \frac{3}{x + 2} \) at \(\left(4, \frac{1}{2}\right)\)
   \(y = 12x - \frac{95}{2}\)

6) \( y = (2x - 8)^{\frac{1}{3}} \) at \((0, -2)\)
   \(y = -6x - 2\)

7) \( y = \ln(x + 4) \) at \((-3, 0)\)
   \(y = -x - 3\)

8) \( y = -\sin(2x) \) at \(\left(-\frac{\pi}{2}, 0\right)\)
   \(y = -\frac{1}{2}x - \frac{\pi}{4}\)

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