

Solution of Quiz 2

- 1 Find an equation of the line L_1 that passes through $(1, -1)$ and is perpendicular to the line L_2 :
 $x + 3y = 2$.

Solution. By rewriting the equation $x + 3y = 2$ in the slope-intercept form $y = -\frac{1}{3}x + \frac{2}{3}$, we see that the line L_2 has slope $m_2 = -\frac{1}{3}$. Thus the line L_1 has slope $m_1 = -\frac{1}{m_2} = 3$. Since the line L_1 contains $(1, -1)$, we have

$$\begin{aligned}y - (-1) &= 3(x - 1) \\y &= 3x - 4\end{aligned}$$

- 2 Find $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$.

Solution. $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2} = \lim_{x \rightarrow 2} \frac{(x - 2)(x + 3)}{x - 2} = \lim_{x \rightarrow 2} (x + 3) = 5$.

- 3 Find $\lim_{x \rightarrow +\infty} \frac{4x^3 + 2x^2 - 5}{3x - 2x^3}$.

Solution. The highest power in the denominator is x^3 . Divide the numerator and the denominator by x^3 to get

$$\lim_{x \rightarrow +\infty} \frac{4x^3 + 2x^2 - 5}{3x - 2x^3} = \lim_{x \rightarrow +\infty} \frac{4 + \frac{2}{x^2} - \frac{5}{x^3}}{\frac{3}{x^2} - 2} = \lim_{x \rightarrow +\infty} \frac{4 + 0 - 0}{0 - 2} = -2.$$