Les 01

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homework assignments

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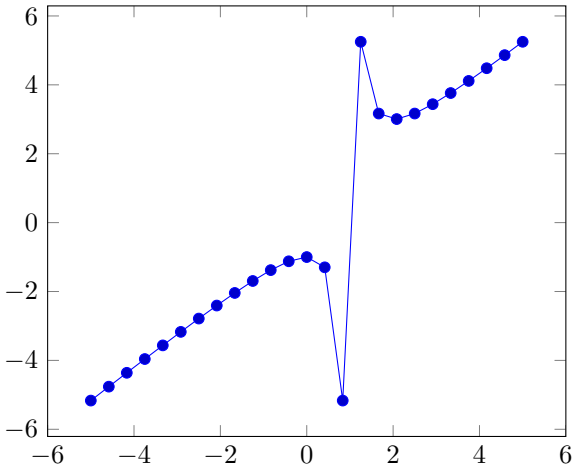
1 2.3.19

A function $y = f(x)$ with a vertical asymptote at $x = 1$ and a slanting asymptote $y = x + 1$ when $x \to \pm\infty$.



$$f(x) = x + \frac{1}{x-1} \tag{1}$$

2 2.3.21

$$\lim_{x\to\infty} \frac{x^2}{x-1} - x \Rightarrow \lim_{x\to\infty} \frac{x}{x-1} = 1 \tag{2}$$

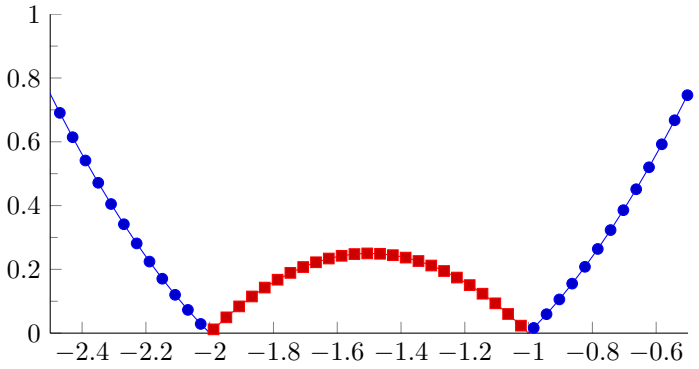
3 2.3.23

$$\lim_{x\to\infty} x\ln(1+\frac{1}{x}) \Leftrightarrow \lim_{x\to\infty} \ln((1+\frac{1}{x})^x) = 1 \tag{3}$$

$\lim_{x\to\infty}(1+\frac{1}{x})^x$ gives us the Euler constant e. And $\log_a(a) = 1$.

4 5.8.13

$$h(x) = |x^2+3x+2| \Leftrightarrow |(1+x)(x+2)| \tag{4}$$



We find the points -2 and -1 to be **non-differentiable**.

5 5.8.15

Using the derivatives table, $f(x) = \sin(x^2)$ gives us $f(x)' = 2x\cos(x^2)$, from which we get to $f(x)'' = 2\cos(x^2) - 4x^2\sin(x^2)$.