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Exercise 1. Fill in the blanks with the simplest equivalent. No justifications required.

2 $\sinh(x) \underset{x \rightarrow 0}{\sim} x$

2 $\cos(x) - 1 \underset{x \rightarrow 0}{\sim} -\frac{x^2}{2}$

3 $e^{\cosh(x)-1} - 1 \underset{x \rightarrow 0}{\sim} \frac{x^2}{2}$

Exercise 2. Fill in the blanks:

1 $(1 - 2x + 3x^2 + o(x^2)) + (x - 3x^2 + o(x^3)) \underset{x \rightarrow 0}{=} 1 - x + o(x^2)$

3 $(1 - 2x + 3x^2 + o(x^2))(x - 3x^2 + o(x^3)) \underset{x \rightarrow 0}{=} x - 5x^2 + 9x^3 + o(x^3)$

4 $\frac{1 - 2x + 3x^2 + o(x^2)}{x - 3x^2 + o(x^3)} \underset{x \rightarrow 0}{=} \frac{1}{x} + 1 + 6x + o(x)$

Exercise 3. Recall the Taylor-Young Theorem.

If f is n ($n \geq 1$) times differentiable at x_0 :

5 $f(x_0+h) \underset{h \rightarrow 0}{=} \sum_{k=0}^n \frac{f^{(k)}(x_0)}{k!} h^k + o(h^n)$