Derivative Rules

Reading

- Sections 3.3

Practice problems

- Section 3.3: 3, 7, 11, 15, 17, 21, 27, 31, 37
- To turn in (together with 3.4): 3.3 4, 18, 32

Notes

Derivative Rules

- Product Rule:

  Product Rule

  $$(fg)'(x) = f'(x)g(x) + f(x)g'(x)$$

- Examples:
  - $(x \sin x)' = \sin x + x \cos x$
  - $(x^2)' = (x \cdot x)' = x' \cdot x + x \cdot x' = 1 \cdot x + x \cdot 1 = 2x$
  - $x^2(\cos x + \sin x)$
- Proof. Visualizing the difference of products in the limit
- Quotient Rule:

  Quotient Rule

  $$\left(\frac{f}{g}\right)' = \frac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$$

- Examples:
  - $\frac{1}{x}$
  - $\frac{x}{1+x+x^2}$