Lecture 20: Worksheet

Anti derivatives

Here are some trickier anti derivative puzzles. We still have no integration techniques and must rely on intuition and experiments to find the derivatives.

It is often a puzzle because we can try to combine derivatives of known functions to get the given function.

1 Find the anti-derivative of the function

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

Hint. First compute the anti derivative of

$$g(x) = \frac{1}{1-x} \ .$$

Can you combine g and $\frac{1-x}{1-x}$ in some way to make it fit?

2 Find the anti derivative of the function

$$f(x) = \sin(x^3)3x^2 \ .$$

Hint. Think about the chain rule.

3 Find the anti-derivative of the function

$$f(x) = \sin(\sin(x)) \cos(x) \ .$$

Hint. Think about the chain rule.

4 Find the anti-derivative of the function

$$f(x) = 2x \sin(x) + x^2 \cos(x) \ .$$

Hint. Think about the product rule.

5 Find the anti-derivative of the function

$$f(x) = e^{e^{e^{e^{e^{e^{e^x}}}}}} \cdot e^{e^{e^{e^{e^x}}}} \cdot e^{e^{e^{e^x}}} \cdot e^{e^{e^x}} \cdot e^{e^x} \cdot e^x \ .$$

Hint. There is no hint.