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0.1 Even and odd functions

0.1.1 Defining odd and even functions

An even function is one where:

$$f(x) = f(-x)$$

An odd function is one where:

$$f(x) = -f(-x)$$

0.1.2 Functions which are even and odd

If a function is even and odd:

$$f(x) = f(-x) = -f(-x)$$

$$f(x) = -f(x)$$

Then $f(x) = 0$.

0.1.3 Scaling odd and even functions

Scaling an even function provides an even function.

$$h(x) = c.f(x)$$

$$h(-x) = c.f(-x)$$

$$h(-x) = c.f(x)$$

$$h(-x) = h(x)$$

Scaling an odd function provides an odd function.

$$h(x) = c.f(x)$$

$$-h(-x) = -c.f(-x)$$

$$-h(-x) = c.f(x)$$

$$-h(-x) = h(x)$$

0.1.4 Adding odd and even functions

Note that 2 even functions added together makes an even function.

$$h(x) = f(x) + g(x)$$

$$h(x) = f(-x) + g(-x)$$

$$h(-x) = f(x) + g(x)$$

$$h(x) = h(-x)$$

And adding 2 odd functions together makes an odd function.

$$h(x) = f(x) + g(x)$$

$$h(x) = -f(-x) - g(-x)$$

$$-h(-x) = f(x) + g(x)$$

$$-h(-x) = h(x)$$

0.1.5 Multiplying odd and even functions

Multiplying 2 even functions together makes an even function.

$$h(x) = f(x)g(x)$$

$$h(-x) = f(-x)g(-x)$$

$$h(-x) = f(x)g(x)$$

$$h(-x) = h(x)$$

Multiplying 2 odd functions together makes an even function.

$$h(x) = f(x)g(x)$$

$$h(-x) = f(-x)g(-x)$$

$$h(-x) = (-1) \cdot (-1) \cdot f(x)g(x)$$

$$h(-x) = h(x)$$