

Exercise 17

Determine whether f is even, odd, or neither even nor odd.

(a) $f(x) = 2x^5 - 3x^2 + 2$

(b) $f(x) = x^3 - x^7$

(c) $f(x) = e^{-x^2}$

(d) $f(x) = 1 + \sin x$

Solution**Part (a)**

$$\begin{aligned}f(-x) &= 2(-x)^5 - 3(-x)^2 + 2 \\&= -2x^5 - 3x^2 + 2 \\&\neq f(x) \\&\neq -f(x)\end{aligned}$$

This function is neither even nor odd.

Part (b)

$$\begin{aligned}f(-x) &= (-x)^3 - (-x)^7 \\&= -x^3 + x^7 \\&= -(x^3 - x^7) \\&= -f(x)\end{aligned}$$

This function is odd.

Part (c)

$$\begin{aligned}f(-x) &= e^{-(-x)^2} \\&= e^{-x^2} \\&= f(x)\end{aligned}$$

This function is even.

Part (d)

$$\begin{aligned}f(-x) &= 1 + \sin(-x) \\&= 1 - \sin x \\&\neq f(x) \\&\neq -f(x)\end{aligned}$$

This function is neither even nor odd.