Exercises

EXERCISE 1

Using `D()`, find the derivative of `3*x^2 - 2*x + 4 ~ x`.

(a) What is the value of the derivative at $x = 0$? -6 -4 -3 -2 0 2 3 4 6

(b) What does a graph of the derivative function look like?

- [A] A negative sloping line
- [B] A positive sloping line
- [C] An upward-facing parabola
- [D] A downward-facing parabola

EXERCISE 2

Using `D()`, find the derivative of `5*exp(.2*x) ~ x`.

(a) What is the value of the derivative at $x = 0$?

-5 -2 -1 0 1 2 5 .

(b) Plot out both the original exponential expression and its derivative. How are they related to each other?

- [A] They are the same function
- [B] Same exponential shape, but different initial values
- [C] The derivative has a faster exponential increase
- [D] The derivative shows an exponential decay

EXERCISE 3

Use `D()` to find the derivative of e^{-x^2} with respect to x (that is, `exp(-(x^2) ~ x)`. Graph the derivative from $x = -2$ to 2. What does the graph look like?

- [A] A bell-shaped mountain
- [B] Exponential growth
- [C] A positive wave followed by a negative wave
- [D] A negative wave followed by a positive wave

EXERCISE 4 What will be the value of this derivative?

`D( fred^2 ~ ginger )`

- [A] 0 everywhere
- [B] 1 everywhere
- [C] A positive sloping line
- [D] A negative sloping line

EXERCISE 5

Use `D()` to find the 3rd derivative of `cos(2*t)`. If you do this by using the `~t&t&t` notation, you will be able to read off a formula for the 3rd derivative. What is it?

- [A] $\sin(t)$
- [B] $\sin(2t)$
- [C] $4\sin(2t)$
- [D] $8\sin(2t)$
- [E] $16\sin(2t)$

What's the 4th derivative?

- [A] $\cos(t)$
- [B] $\cos(2t)$
- [C] $4\cos(2t)$
- [D] $8\cos(2t)$
- [E] $16\cos(2t)$

EXERCISE 6

Compute and graph the 4th derivative of `cos(2*t^2)~t` from $t = 0$ to 5. What does the graph look like?

- [A] A constant
- [B] A cosine whose period decreases as t gets bigger
- [C] A cosine whose amplitude increases and whose period decreases as t gets bigger
- [D] A cosine whose amplitude decreases and whose period increases as t gets bigger

For `cos(2*t^2)~t` the fourth derivate is a complicated-looking expression made up of simpler expressions. What functions appear