

Exercise 4.1.85 Find the real zeros of  $f(x) = 3(x^2 - 1)(x^2 + 4x + 3)^2$  and their multiplicities.

Solution

Notice that  $x^2 - 1 = (x - 1)(x + 1)$  and  $x^2 + 4x + 3 = (x + 3)(x + 1)$ , so

$$\begin{aligned} f(x) &= 3(x - 1)(x + 1)((x + 3)(x + 1))^2 \\ &= 3(x - 1)(x + 1)^3(x + 3)^2. \end{aligned}$$

The zeros of  $f$  are:

- |    |                    |
|----|--------------------|
| 1  | of multiplicity 1  |
| -1 | of multiplicity 3  |
| -3 | of multiplicity 2. |

□