

Exercises on basic computation skills

These basic exercises serve to recall some basic computation skills from high school, which can be useful for the exam. You should recall how to multiply, add and divide fractions. You should also recall the definition of the factorial function:

$$n! = n \cdot (n-1) \cdot (n-2) \cdot \dots \cdot 2 \cdot 1$$

and the rules for computing with powers:

$$x^y \cdot x^z = x^{y+z} \quad (x^y)^z = x^{y \cdot z} \quad x^{-y} = \frac{1}{x^y} \quad x^{1/n} = \sqrt[n]{x} \quad x^y \cdot z^y = (x \cdot z)^y \quad \sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$$

The exercise is simply to reduce the following expressions as far as possible. In these exercises x, y, z are always real numbers and n is a natural number.

$$(1) \quad \frac{2x^2 - x}{3x}$$

$$(3) \quad \left(\frac{x^3 + 2x^2}{2x - 1} \right) \cdot \left(\frac{4x^2 - 2x}{2x - 8} \right)$$

$$(5) \quad \frac{1/x}{x}$$

$$(7) \quad \frac{1/x}{1/x^2}$$

$$(9) \quad \frac{x^3}{x^{-2}}$$

$$(11) \quad \frac{x^{-3}}{x^{-2}}$$

$$(13) \quad n! \left(\frac{x^3}{(n+1)!x^2} \right)$$

$$(15) \quad \left(\frac{2^x}{n!} \right) \cdot \left(\frac{(n+1)!}{4^x} \right)$$

$$(17) \quad (-1)^{2n+1}$$

$$(19) \quad (-1)^n \cdot (x-1)^n$$

$$(2) \quad \left(\frac{x^3 + 2x^2}{2x - 1} \right) \cdot \left(\frac{4x^2 - 2x}{2x} \right)$$

$$(4) \quad \left(\frac{x^3 + 2x^2}{2x - 1} \right) / \left(\frac{2x - 8}{4x^2 - 2x} \right)$$

$$(6) \quad \frac{1/x^2}{1/x}$$

$$(8) \quad x^3 \cdot x^{-2}$$

$$(10) \quad \frac{x^{-3}}{x}$$

$$(12) \quad \frac{(n+1)!x^3}{n!x^2}$$

$$(14) \quad \frac{2^x}{2^{-2x}}$$

$$(16) \quad (-1)^{2n}$$

$$(18) \quad (-1)^n \cdot (-x)^n$$

$$(20) \quad \left(\sqrt{\frac{x}{y}} \right) \cdot \sqrt{y}$$