

a) $f(x) = -x + 2$

$$f(1) = -1 + 2 = 1$$

$$f(0) = -0 + 2 = 2$$

$$f(-3) = -(-3) + 2 = 3 + 2 = 5$$

$$f\left(\frac{1}{4}\right) = -\frac{1}{4} + 2 = 1\frac{3}{4}$$

$$f\left(-\frac{1}{2}\right) = -\left(-\frac{1}{2}\right) + 2 = \frac{1}{2} + 2 = 2\frac{1}{2}$$

b) $f(x) = \frac{1}{2}x - 2$

$$f(1) = \frac{1}{2} \cdot 1 - 2 = \frac{1}{2} - 2 = -1,5$$

$$f(0) = \frac{1}{2} \cdot 0 - 2 = -2$$

$$f(-3) = \frac{1}{2} \cdot (-3) - 2 = -1,5 - 2 = -3,5$$

$$f\left(\frac{1}{4}\right) = \frac{1}{2} \cdot \frac{1}{4} - 2 = \frac{1}{8} - 2 = -1\frac{7}{8}$$

$$f\left(-\frac{1}{2}\right) = \frac{1}{2} \cdot \left(-\frac{1}{2}\right) - 2 = -\frac{1}{4} - 2 = -2\frac{1}{4}$$

c) $f(x) = -2x^2 + 1$

$$f(1) = -2 \cdot 1^2 + 1 = -2 + 1 = -1$$

$$f(0) = -2 \cdot 0^2 + 1 = 0 + 1 = 1$$

$$f(-3) = -2 \cdot (-3)^2 + 1 = -2 \cdot 9 + 1 = -17$$

$$f\left(\frac{1}{4}\right) = -2 \cdot \left(\frac{1}{4}\right)^2 + 1 = -2 \cdot \frac{1}{16} + 1 = -\frac{1}{8} + 1 = \frac{7}{8}$$

$$f\left(-\frac{1}{2}\right) = -2 \cdot \left(-\frac{1}{2}\right)^2 + 1 = -2 \cdot \frac{1}{4} + 1 = -\frac{1}{2} + 1 = \frac{1}{2}$$

Hinweis: Die Klammern bei $(-3)^2$; $\left(\frac{1}{4}\right)^2$ und $\left(-\frac{1}{2}\right)^2$ dürfen auf keinen Fall weggelassen werden!

d) $f(x) = \frac{1}{x}$

$$f(1) = \frac{1}{1} = 1$$

$$f(0) = \frac{1}{0} \text{ ist nicht definiert}$$

$$f(-3) = \frac{1}{-3} = -\frac{1}{3}$$

$$f\left(\frac{1}{4}\right) = \frac{1}{\frac{1}{4}} = 1 \cdot \frac{4}{1} = 4$$

$$f\left(-\frac{1}{2}\right) = \frac{1}{-\frac{1}{2}} = 1 \cdot \left(-\frac{2}{1}\right) = -2$$

e) $f(x) = \frac{2x}{x+1}$

$$f(1) = \frac{2 \cdot 1}{1+1} = \frac{2}{2} = 1$$

$$f(0) = \frac{2 \cdot 0}{0+1} = \frac{0}{1} = 0$$

$$f(-3) = \frac{2 \cdot (-3)}{-3+1} = \frac{-6}{-2} = 3$$

$$f\left(\frac{1}{4}\right) = \frac{2 \cdot \frac{1}{4}}{\frac{1}{4}+1} = \frac{\frac{1}{2}}{\frac{5}{4}} = \frac{1}{2} \cdot \frac{4}{5} = \frac{2}{5}$$

$$f\left(-\frac{1}{2}\right) = \frac{2 \cdot \left(-\frac{1}{2}\right)}{-\frac{1}{2}+1} = \frac{-1}{\frac{1}{2}} = -1 \cdot \frac{2}{1} = -2$$

f) $f(x) = (3x - 1)^2$

$$f(1) = (3 \cdot 1 - 1)^2 = 2^2 = 4$$

$$f(0) = (3 \cdot 0 - 1)^2 = (-1)^2 = 1$$

$$f(-3) = [3 \cdot (-3) - 1]^2 = [-9 - 1]^2 = (-10)^2 = 100$$

$$f\left(\frac{1}{4}\right) = \left(3 \cdot \frac{1}{4} - 1\right)^2 = \left(-\frac{1}{4}\right)^2 = \frac{1}{16}$$

$$f\left(-\frac{1}{2}\right) = \left[3 \cdot \left(-\frac{1}{2}\right) - 1\right]^2 = \left[-\frac{3}{2} - 1\right]^2 = \left[-\frac{5}{2}\right]^2 = \frac{25}{4}$$

g) $f(x) = (3x)^2 - 1$

$$f(1) = (3 \cdot 1)^2 - 1 = 9 - 1 = 8$$

$$f(0) = (3 \cdot 0)^2 - 1 = -1$$

$$f(-3) = [3 \cdot (-3)]^2 - 1 = (-9)^2 - 1 = 81 - 1 = 80$$

$$f\left(\frac{1}{4}\right) = \left(3 \cdot \frac{1}{4}\right)^2 - 1 = \left(\frac{3}{4}\right)^2 - 1 = \frac{9}{16} - 1 = -\frac{7}{16}$$

$$f\left(-\frac{1}{2}\right) = \left[3 \cdot \left(-\frac{1}{2}\right)\right]^2 - 1 = \left(-\frac{3}{2}\right)^2 - 1 = \frac{9}{4} - 1 = \frac{5}{4}$$

h) $f(x) = 3x^2 - 1$

$$f(1) = 3 \cdot 1^2 - 1 = 2$$

$$f(0) = 3 \cdot 0^2 - 1 = -1$$

$$f(-3) = 3 \cdot (-3)^2 - 1 = 3 \cdot 9 - 1 = 26$$

$$f\left(\frac{1}{4}\right) = 3 \cdot \left(\frac{1}{4}\right)^2 - 1 = 3 \cdot \frac{1}{16} - 1 = \frac{3}{16} - 1 = -\frac{13}{16}$$

$$f\left(-\frac{1}{2}\right) = 3 \cdot \left(-\frac{1}{2}\right)^2 - 1 = 3 \cdot \frac{1}{4} - 1 = \frac{3}{4} - 1 = -\frac{1}{4}$$

$$\text{i) } f(x) = (3x - 1)(3x + 1)$$

$$f(1) = (3 \cdot 1 - 1)(3 \cdot 1 + 1) = (3 - 1)(3 + 1) = 2 \cdot 4 = 8$$

$$f(0) = (3 \cdot 0 - 1)(3 \cdot 0 + 1) = -1 \cdot 1 = -1$$

$$f(-3) = (3 \cdot (-3) - 1)(3 \cdot (-3) + 1) = (-9 - 1)(-9 + 1) = -10 \cdot (-8) = 80$$

$$f\left(\frac{1}{4}\right) = \left(3 \cdot \frac{1}{4} - 1\right)\left(3 \cdot \frac{1}{4} + 1\right) = \left(\frac{3}{4} - 1\right)\left(\frac{3}{4} + 1\right) = -\frac{1}{4} \cdot \frac{7}{4} = -\frac{7}{16}$$

$$f\left(-\frac{1}{2}\right) = \left[3 \cdot \left(-\frac{1}{2}\right) - 1\right]\left[3 \cdot \left(-\frac{1}{2}\right) + 1\right] = \left[-\frac{3}{2} - 1\right]\left[-\frac{3}{2} + 1\right] = -\frac{5}{2} \cdot \left(-\frac{1}{2}\right) = \frac{5}{4}$$

$$\text{j) } f(x) = \frac{2x}{-x^2 + 1}$$

$$f(1) = \frac{2 \cdot 1}{-1^2 + 1} = \frac{2}{-1 + 1} = \frac{2}{0} \text{ ist nicht definiert}$$

$$f(0) = \frac{2 \cdot 0}{-0^2 + 1} = \frac{0}{1} = 0$$

$$f(-3) = \frac{2 \cdot (-3)}{-(-3)^2 + 1} = \frac{-6}{-9 + 1} = \frac{-6}{-8} = \frac{3}{4}$$

$$f\left(\frac{1}{4}\right) = \frac{2 \cdot \frac{1}{4}}{-\left(\frac{1}{4}\right)^2 + 1} = \frac{\frac{1}{2}}{-\frac{1}{16} + 1} = \frac{\frac{1}{2}}{\frac{15}{16}} = \frac{1}{2} \cdot \frac{16}{15} = \frac{8}{15}$$

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

Bei Druckfehlern bitte Rückmeldung an schule@christoph-gnandt.de