

Exercice 4.5.

$$\text{a) } (\sqrt[3]{x})' = (x^{1/3})' = \frac{1}{3} x^{\frac{1}{3}-1} = \frac{1}{3} x^{-\frac{2}{3}} = \frac{1}{3 \cdot x^{2/3}} = \boxed{\frac{1}{3\sqrt[3]{x^2}}}$$

$$\text{b) } (\sqrt[7]{x^3})' = (x^{3/7})' = \frac{3}{7} x^{\frac{3}{7}-1} = \frac{3}{7} x^{-\frac{4}{7}} = \frac{3}{7 \cdot x^{4/7}} = \boxed{\frac{3}{7\sqrt[7]{x^4}}}$$

$$\text{c) } [\sqrt{x^2 - 3x + 2}]' = [(x^2 - 3x + 2)^{1/2}]' = \frac{1}{2} \cdot (x^2 - 3x + 2)^{\frac{1}{2}-1} \cdot (x^2 - 3x + 2)' =$$

$$\boxed{\begin{array}{l} u(x) = x^2 - 3x + 2 \\ u'(x) = 2x - 3 \end{array}}$$

$$= \frac{1}{2} (x^2 - 3x + 2)^{-1/2} (2x - 3) = \frac{2x - 3}{2(x^2 - 3x + 2)^{1/2}} = \boxed{\frac{2x - 3}{2\sqrt{x^2 - 3x + 2}}}$$

$$\text{d) } [\sqrt[3]{2 - x^2}]' = [(2 - x^2)^{1/3}]' = \frac{1}{3} \cdot (2 - x^2)^{\frac{1}{3}-1} \cdot (2 - x^2)' =$$

$$\boxed{\begin{array}{l} u(x) = 2 - x^2 \\ u'(x) = -2x \end{array}}$$

$$= \frac{1}{3} (2 - x^2)^{-2/3} (-2x) = \frac{-2x}{3(2 - x^2)^{2/3}} = \boxed{\frac{-2x}{3\sqrt[3]{(2 - x^2)^2}}}$$

$$\text{e) } \left[\frac{1}{\sqrt{1 - 2x}} \right]' = [(1 - 2x)^{-1/2}]' = -\frac{1}{2} \cdot (1 - 2x)^{-\frac{1}{2}-1} \cdot (1 - 2x)' =$$

$$\boxed{\begin{array}{l} u(x) = 1 - 2x \\ u'(x) = -2 \end{array}}$$

$$= -\frac{1}{2} (1 - 2x)^{-3/2} (-2) = -\frac{-2}{2(1 - 2x)^{3/2}} = \boxed{\frac{1}{\sqrt{(1 - 2x)^3}}}$$

$$\text{f) } [\sqrt{x^2 - 1}]' = [(x^2 - 1)^{1/2}]' = \frac{1}{2} \cdot (x^2 - 1)^{\frac{1}{2}-1} \cdot (x^2 - 1)' =$$

$$\boxed{\begin{array}{l} u(x) = x^2 - 1 \\ u'(x) = 2x \end{array}}$$

$$= \frac{1}{2} (x^2 - 1)^{-1/2} (2x) = \frac{2x}{2(x^2 - 1)^{1/2}} = \boxed{\frac{x}{\sqrt{x^2 - 1}}}$$