5.20

1) $f'(x) = \left(\dfrac{1}{x^3}\right)' = (x^{-3})' = -3\,x^{-4} = -3 \cdot \dfrac{1}{x^4} = -\dfrac{3}{x^4}$

2) $f'(x) = \left(\dfrac{7}{x^5}\right)' = \left(7 \cdot \dfrac{1}{x^5}\right)' = 7\,(x^{-5})' = 7 \cdot (-5)\,x^{-6} = -35 \cdot \dfrac{1}{x^6} = -\dfrac{35}{x^6}$

3) $f'(x) = (\sqrt[3]{x})' = (\sqrt[3]{x^1})' = (x^{\frac{1}{3}})' = \frac{1}{3}\,x^{-\frac{2}{3}} = \dfrac{1}{3} \cdot \dfrac{1}{x^{\frac{2}{3}}} = \dfrac{1}{3\,\sqrt[3]{x^2}}$

4) $f'(x) = (\sqrt[3]{x^2})' = (x^{\frac{2}{3}})' = \frac{2}{3}\,x^{-\frac{1}{3}} = \dfrac{2}{3} \cdot \dfrac{1}{x^{\frac{1}{3}}} = \dfrac{2}{3\,\sqrt[3]{x}}$

5) $f'(x) = (\sqrt{x^3})' = (\sqrt[2]{x^3})' = (x^{\frac{3}{2}})' = \frac{3}{2}\,x^{\frac{1}{2}} = \frac{3}{2}\,\sqrt[2]{x^1} = \frac{3}{2}\,\sqrt{x}$

6) $f'(x) = \left(\dfrac{1}{\sqrt[4]{x}}\right)' = \left(\dfrac{1}{\sqrt[4]{x^1}}\right)' = \left(\dfrac{1}{x^{\frac{1}{4}}}\right)' = (x^{-\frac{1}{4}})' = -\frac{1}{4}\,x^{-\frac{5}{4}} = -\dfrac{1}{4} \cdot \dfrac{1}{x^{\frac{5}{4}}}$

$\qquad = -\dfrac{1}{4\,\sqrt[4]{x^5}}$