8. $f(x) = \dfrac{6}{7\sqrt[5]{x^2}}$

$= \dfrac{6}{7x^{\frac{2}{5}}}$

$= \dfrac{6}{7} x^{-\frac{2}{5}}$

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

$= \dfrac{-12}{35} x^{-\frac{7}{5}}$

$= \boxed{\dfrac{-12}{35x^{7/5}}}$

9. $f(x) = 3x^2 - 5x - 2x^{-3} + 4x^{-4}$

$f'(x) = 3 \cdot 2x^1 - 5 - 2(-3)x^{-4} + 4(-4)x^{-5}$

$= 6x - 5 + 6x^{-4} - 16x^{-5}$

$= 6x - 5 + \dfrac{6}{x^4} - \dfrac{16}{x^5}$

$= \dfrac{6x}{1} - \dfrac{5}{1} + \dfrac{6}{x^4} - \dfrac{16}{x^5}$

$= \dfrac{6x \cdot x^5}{x^5} - \dfrac{5 \cdot x^5}{x^5} + \dfrac{6 \cdot x}{x^5} - \dfrac{16}{x^5}$

$= \dfrac{6x^6}{x^5} - \dfrac{5x^5}{x^5} + \dfrac{6x}{x^5} - \dfrac{16}{x^5}$

$= \boxed{\dfrac{6x^6 - 5x^5 + 6x - 16}{x^5}}$

10. $f(x) = (7x^2 - 4x)(x^2 + 3)$

$= 7x^4 + 21x^2 - 4x^3 - 12x$

$= 7x^4 - 4x^3 + 21x^2 - 12x$

$f'(x) = 7 \cdot 4x^3 - 4 \cdot 3x^2 + 21 \cdot 2x^1 - 12$

$= \boxed{28x^3 - 12x^2 + 42x - 12}$