

Practice - Power Rule

Differentiate each function with respect to the given variable.

$$1) f(s) = 4s^3 + \sqrt{3} \cdot \sqrt[5]{s^2}$$

$$f(s) = 4s^3 + \sqrt{3} \cdot s^{2/5}$$

$$f'(s) = 12s^2 - \frac{2\sqrt{3}}{5} s^{-3/5}$$

$$f'(s) = 12s^2 - \frac{2\sqrt{3}}{5\sqrt[5]{s^3}}$$

$$3) h(t) = \frac{2}{3}t^{1/3} - \frac{5}{4} + t^{-4}\sqrt{5}$$

$$h(t) = \frac{2}{3}t^{1/3} - \frac{5}{4} + \sqrt{5}t^{-4}$$

$$h'(t) = \frac{2}{9}t^{-2/3} - 4\sqrt{5}t^{-5}$$

$$5) g(t) = 2$$

$$g'(t) = 0$$

$$6) h(w) = -\frac{1}{2}w^{1/4} + 1$$

$$h'(w) = -\frac{1}{8}w^{-3/4}$$

$$7) h(r) = \frac{5}{2r} \quad h(r) = \frac{5}{2}r^{-1}$$

$$h'(r) = -\frac{5}{2}r^{-2}$$

$$h'(r) = -\frac{5}{2r^2}$$

$$8) h(t) = \frac{2}{5}t^3 - \frac{1}{3}t^{5/4}$$

$$h'(t) = \frac{6}{5}t^2 - \frac{5}{12}t^{1/4}$$

$$9) g(s) = -\frac{5}{4}s^3$$

$$g'(s) = -\frac{15}{4}s^2$$

$$10) f(t) = \frac{4}{3}t^5 + \frac{3}{5t} \quad f(t) = \frac{4}{3}t^5 + \frac{3}{5}t^{-1}$$

$$f'(t) = \frac{20}{3}t^4 - \frac{3}{5}t^{-2}$$

$$f'(t) = \frac{20}{3}t^4 - \frac{3}{5t^2}$$

$$11) h(r) = \frac{3}{4r^2} \quad h(r) = \frac{3}{4}r^{-2}$$

$$h'(r) = -\frac{3}{2}r^{-3}$$

$$h'(r) = -\frac{3}{2r^3}$$

$$12) h(r) = 5r^{-1}$$

$$h'(r) = -5r^{-2}$$

$$13) g(x) = \frac{5}{4}x^5$$

$$g'(x) = \frac{25}{4}x^4$$

$$14) h(t) = -2t^{\frac{4}{3}} + t^{-2}\sqrt{5} + \frac{3}{t^4} \quad h(t) = -2t^{\frac{4}{3}} + \sqrt{5}t^{-2} + 3t^{-4}$$

$$h'(t) = -\frac{8}{3}t^{\frac{1}{3}} - 2\sqrt{5}t^{-3} - 12t^{-5}$$

$$15) h(r) = r^{\frac{4}{5}}\sqrt{2} + \sqrt{2} \cdot \sqrt[3]{r} \quad h(r) = \sqrt{2}r^{\frac{4}{5}} + \sqrt{2}r^{\frac{1}{3}}$$

$$h'(r) = \frac{4\sqrt{2}}{5}r^{-\frac{1}{5}} + \frac{\sqrt{2}}{3}r^{-\frac{2}{3}}$$

$$h'(r) = \frac{4\sqrt{2}}{5\sqrt[5]{r}} + \frac{\sqrt{2}}{3\sqrt[3]{r^2}}$$

$$16) h(s) = 4s^{-2} + \frac{1}{3s^5} \quad h(s) = 4s^{-2} + \frac{1}{3}s^{-5}$$

$$h'(s) = -8s^{-3} - \frac{5}{3}s^{-6}$$

$$17) h(r) = \frac{3}{5}\sqrt[5]{r} + \sqrt{2} + \frac{5}{r^5} \quad h(r) = \frac{3}{5}r^{\frac{1}{5}} + \sqrt{2} + 5r^{-5}$$

$$h'(r) = \frac{3}{25}r^{-\frac{4}{5}} - 25r^{-6}$$

$$h'(r) = \frac{3}{25\sqrt[5]{r^4}} - \frac{25}{r^6}$$

$$18) f(t) = 3t^{\frac{1}{2}}$$

$$f'(t) = \frac{3}{2}t^{-\frac{1}{2}}$$

$$19) h(x) = -\frac{5}{3}x^{\frac{4}{3}} - \frac{1}{3}\sqrt[5]{x^2} + \frac{3}{4x^2} \quad h(x) = -\frac{5}{3}x^{\frac{4}{3}} - \frac{1}{3}x^{\frac{2}{5}} + \frac{3}{4}x^{-2}$$

$$h'(x) = -\frac{20}{9}x^{\frac{1}{3}} - \frac{2}{15}x^{-\frac{3}{5}} - \frac{3}{2}x^{-3}$$

$$20) h(x) = 2x^5$$

$$h'(x) = 10x^4$$

$$21) g(x) = \frac{1}{3}$$

$$g'(x) = 0$$

$$22) g(t) = -\frac{2}{3}t^{-5}$$

$$g'(t) = \frac{10}{3}t^{-6}$$

$$23) f(w) = \frac{5}{3}\sqrt[5]{w^2} + 3 \quad f(w) = \frac{5}{3}w^{\frac{2}{5}} + 3$$

$$f'(w) = \frac{2}{3}w^{-\frac{3}{5}}$$

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

$$24) g(r) = \sqrt{3} + \frac{3}{r^2} \quad g(r) = \sqrt{3} + 3r^{-2}$$

$$g'(r) = -6r^{-3}$$

$$g'(r) = -\frac{6}{r^3}$$

$$25) f(s) = s\sqrt{2} + \frac{1}{3} + 5s^{-2}$$

$$f'(s) = \sqrt{2} - 10s^{-3}$$

$$27) g(t) = 4 + 5t^{-4}$$

$$g'(t) = -20t^{-5}$$

$$29) f(s) = \frac{3}{5}\sqrt[3]{s} - \frac{1}{2}s^{\frac{1}{4}} + s^{-4}\sqrt{2}$$

$$f(s) = \frac{3}{5}s^{\frac{1}{3}} - \frac{1}{2}s^{\frac{1}{4}} + \sqrt{2}s^{-4}$$

$$f'(s) = \frac{1}{5}s^{-\frac{2}{3}} - \frac{1}{8}s^{-\frac{3}{4}} - 4\sqrt{2}s^{-5}$$

$$26) g(w) = \frac{1}{2}\sqrt[3]{w^2}$$

$$g(w) = \frac{1}{2}w^{\frac{2}{3}}$$

$$g'(w) = \frac{1}{3}w^{-\frac{1}{3}}$$

$$g'(w) = \frac{1}{3\sqrt[3]{w}}$$

$$28) f(x) = -\frac{1}{2} + 2x^{-4}$$

$$f'(x) = -8x^{-5}$$

$$30) f(x) = x^{\frac{3}{4}}\sqrt{5}$$

$$f(x) = \sqrt{5}x^{\frac{3}{4}}$$

$$f'(x) = \frac{3\sqrt{5}}{4}x^{-\frac{1}{4}}$$

$$f'(x) = \frac{3\sqrt{5}}{4\sqrt[4]{x}}$$

