

Power Rule of Differentiation

Date _____ Period _____

Differentiate each function with respect to the given variable.

1) $t = -\frac{1}{5}r^5 - \frac{1}{3}r^{\frac{3}{2}} + 5r^{\frac{2}{5}}$

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

3) $g = \frac{4}{3}s - \frac{1}{3}s^{\frac{4}{5}} + \frac{3}{4}s^{-1}$

4) $y = 2r + 2r^{\frac{3}{4}} + 2r^{-2}$

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

6) $r = \frac{5}{2}s^5 - \frac{5}{4}s^{\frac{1}{2}} + \frac{3}{4}s^{-1}$

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

8) $g = -3t^3 + \frac{1}{2}t^{\frac{5}{2}} + 2t^{\frac{1}{3}}$

$$9) y = -\frac{3}{4}t^3 + \frac{1}{3}t^{\frac{5}{2}} - t^{\frac{4}{5}}$$

$$10) g = \frac{1}{4}x^{\frac{3}{5}} - 2x^{\frac{2}{5}} - \frac{1}{2}x^{-4}$$

$$11) r = -\frac{3}{2}s^5 - s - \frac{3}{5}s^{\frac{2}{3}}$$

$$12) y = -\frac{1}{3}r^5 - \frac{2}{3}r^4 + 5r^{-4}$$

$$13) y = -\frac{1}{2}s^2 + s^{-2} + 2s^{-5}$$

$$14) f = r^4 - \frac{1}{2}r^3 - \frac{3}{4}r$$

$$15) y = 4t^4 - \frac{2}{5}t^{-1} + 4t^{-3}$$

$$16) h = 2r^4 - 5r^{-1} + 5r^{-3}$$

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Differentiate each function with respect to the given variable.

1) $t = -\frac{1}{5}r^5 - \frac{1}{3}r^{\frac{3}{2}} + 5r^{\frac{2}{5}}$

$$\frac{dt}{dr} = -r^4 - \frac{r^{\frac{1}{2}}}{2} + \frac{2}{r^{\frac{3}{5}}}$$

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

$$\frac{df}{dt} = -\frac{15}{16t^{\frac{1}{4}}} + \frac{1}{3t^{\frac{2}{3}}} + \frac{16}{3t^5}$$

3) $g = \frac{4}{3}s - \frac{1}{3}s^{\frac{4}{5}} + \frac{3}{4}s^{-1}$

$$\frac{dg}{ds} = \frac{4}{3} - \frac{4}{15s^{\frac{1}{5}}} - \frac{3}{4s^2}$$

4) $y = 2r + 2r^{\frac{3}{4}} + 2r^{-2}$

$$\frac{dy}{dr} = 2 + \frac{3}{2r^{\frac{1}{4}}} - \frac{4}{r^3}$$

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

$$\frac{dh}{dt} = -\frac{8t}{3} - \frac{1}{4t^2} + \frac{12}{5t^4}$$

6) $r = \frac{5}{2}s^5 - \frac{5}{4}s^{\frac{1}{2}} + \frac{3}{4}s^{-1}$

$$\frac{dr}{ds} = \frac{25s^4}{2} - \frac{5}{8s^{\frac{1}{2}}} - \frac{3}{4s^2}$$

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

$$\frac{dh}{dr} = -\frac{5r^{\frac{1}{4}}}{4} - \frac{5}{4r^{\frac{1}{2}}} - \frac{9}{4r^4}$$

8) $g = -3t^3 + \frac{1}{2}t^{\frac{5}{2}} + 2t^{\frac{1}{3}}$

$$\frac{dg}{dt} = -9t^2 + \frac{5t^{\frac{3}{2}}}{4} + \frac{2}{3t^{\frac{2}{3}}}$$

$$9) y = -\frac{3}{4}t^3 + \frac{1}{3}t^{\frac{5}{2}} - t^{\frac{4}{5}}$$

$$\frac{dy}{dt} = -\frac{9t^2}{4} + \frac{5t^{\frac{3}{2}}}{6} - \frac{4}{5t^{\frac{1}{5}}}$$

$$10) g = \frac{1}{4}x^{\frac{3}{5}} - 2x^{\frac{2}{5}} - \frac{1}{2}x^{-4}$$

$$\frac{dg}{dx} = \frac{3}{20x^{\frac{2}{5}}} - \frac{4}{5x^{\frac{3}{5}}} + \frac{2}{x^5}$$

$$11) r = -\frac{3}{2}s^5 - s - \frac{3}{5}s^{\frac{2}{3}}$$

$$\frac{dr}{ds} = -\frac{15s^4}{2} - 1 - \frac{2}{5s^{\frac{1}{3}}}$$

$$12) y = -\frac{1}{3}r^5 - \frac{2}{3}r^4 + 5r^{-4}$$

$$\frac{dy}{dr} = -\frac{5r^4}{3} - \frac{8r^3}{3} - \frac{20}{r^5}$$

$$13) y = -\frac{1}{2}s^2 + s^{-2} + 2s^{-5}$$

$$\frac{dy}{ds} = -s - \frac{2}{s^3} - \frac{10}{s^6}$$

$$14) f = r^4 - \frac{1}{2}r^3 - \frac{3}{4}r$$

$$\frac{df}{dr} = 4r^3 - \frac{3r^2}{2} - \frac{3}{4}$$

$$15) y = 4t^4 - \frac{2}{5}t^{-1} + 4t^{-3}$$

$$\frac{dy}{dt} = 16t^3 + \frac{2}{5t^2} - \frac{12}{t^4}$$

$$16) h = 2r^4 - 5r^{-1} + 5r^{-3}$$

$$\frac{dh}{dr} = 8r^3 + \frac{5}{r^2} - \frac{15}{r^4}$$