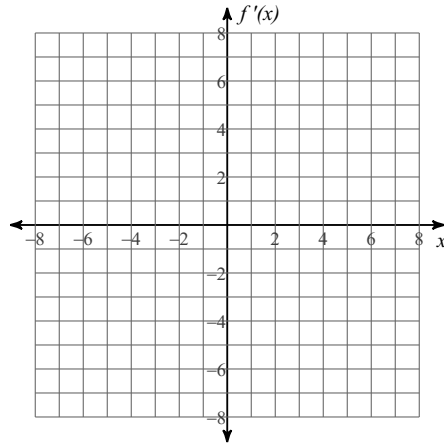
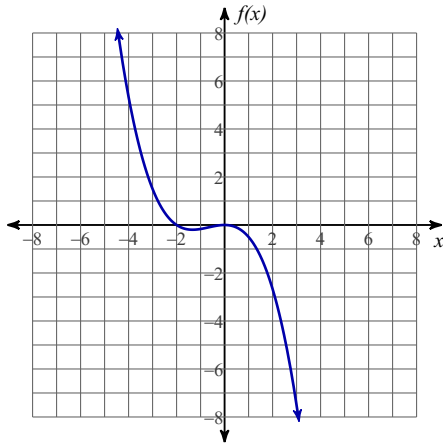


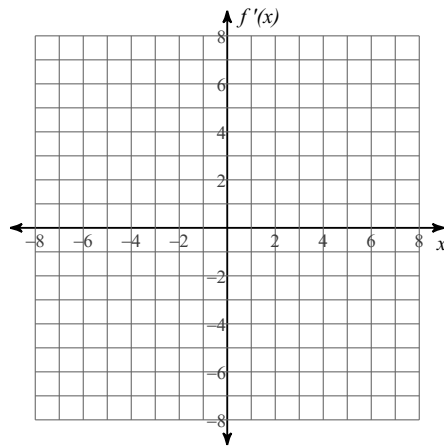
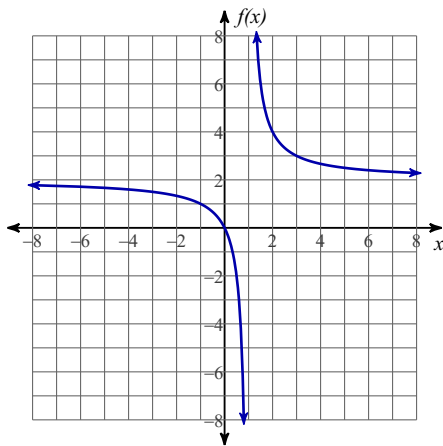
Worksheet 2A

Given the graph of  $f(x)$ , sketch an approximate graph of  $f'(x)$ .

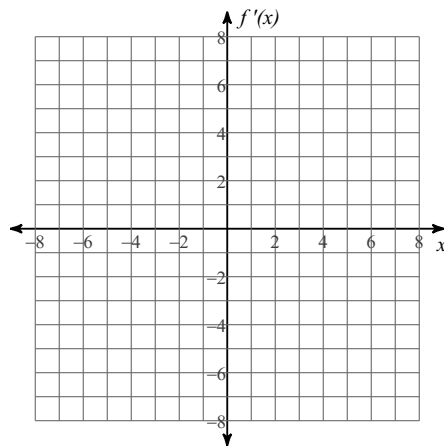
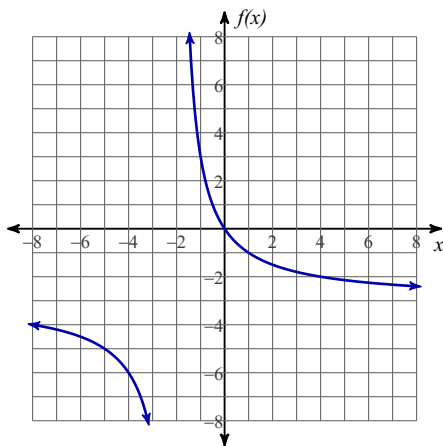
1)



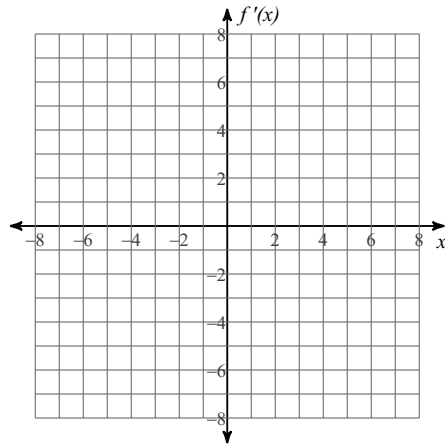
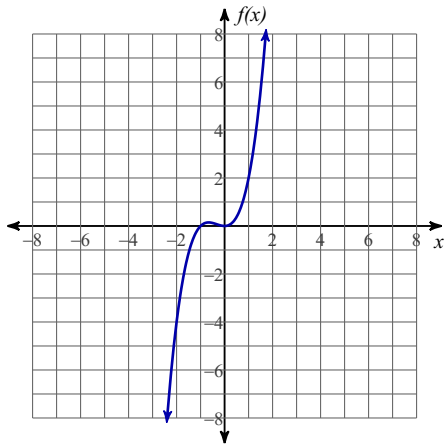
2)



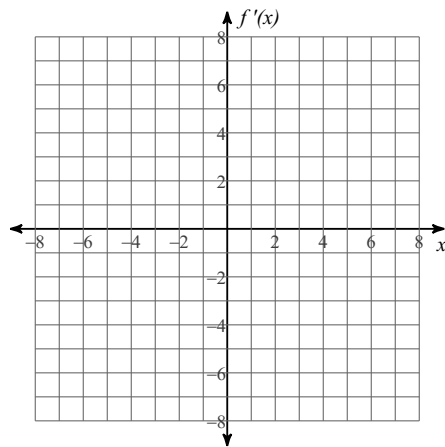
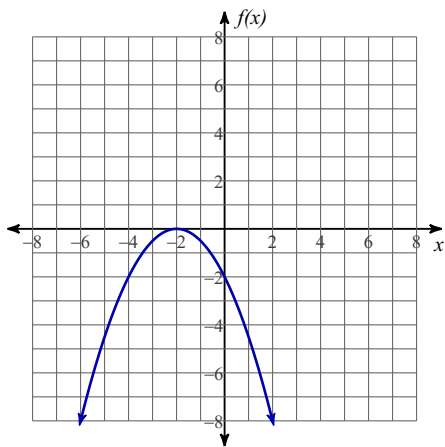
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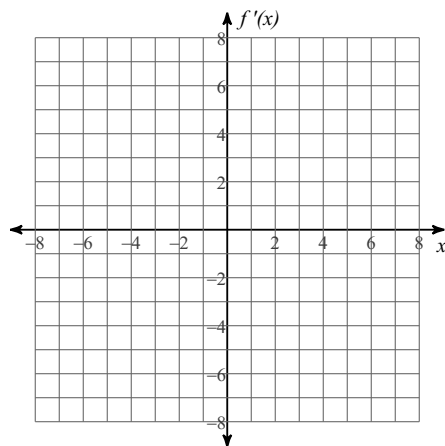
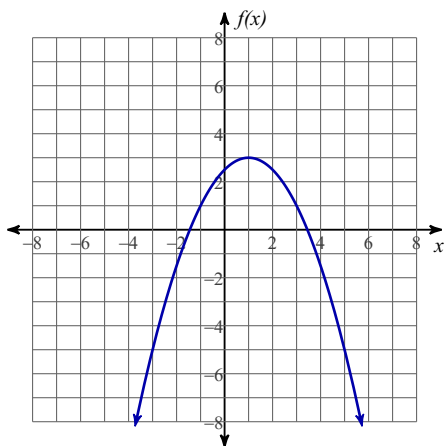
4)



5)

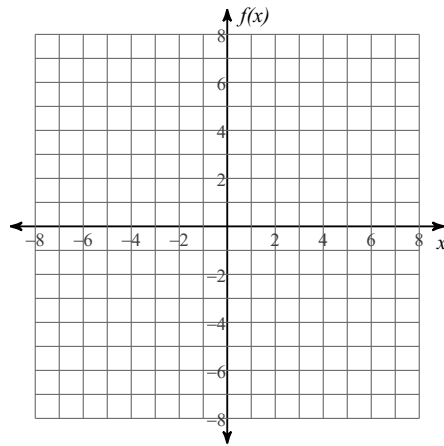
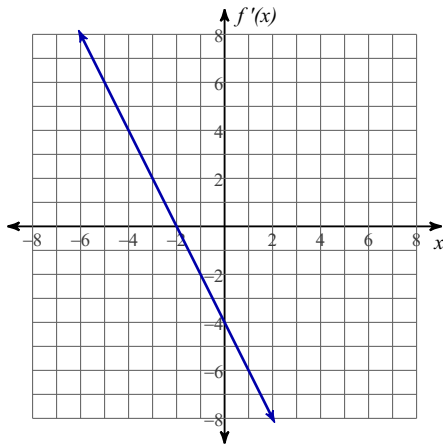


6)

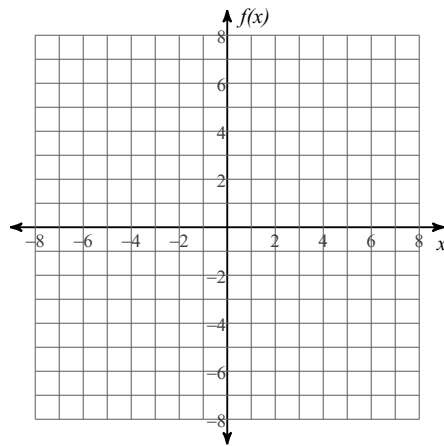
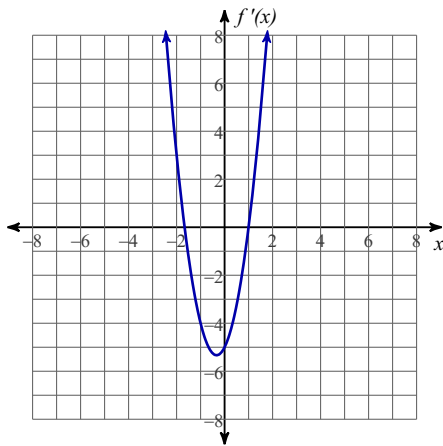


Given the graph of  $f'(x)$ , sketch a possible graph of  $f(x)$ .

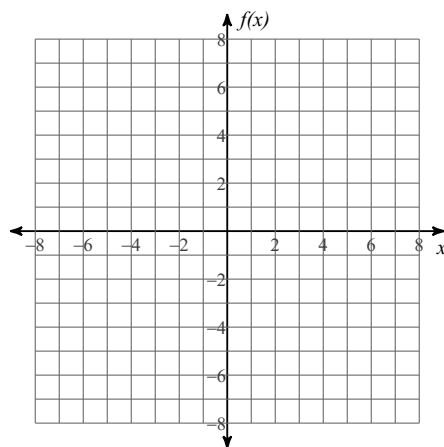
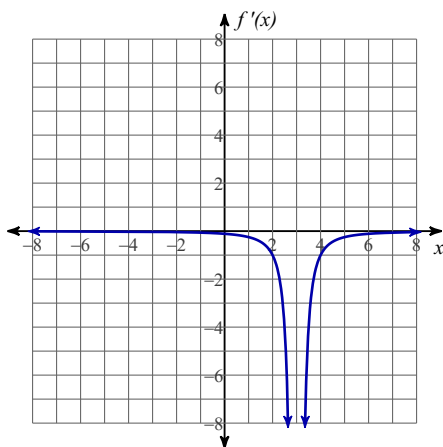
7)



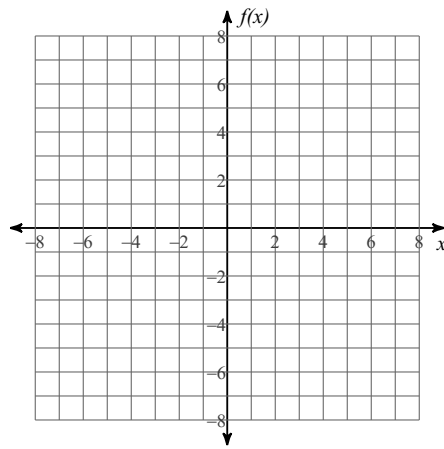
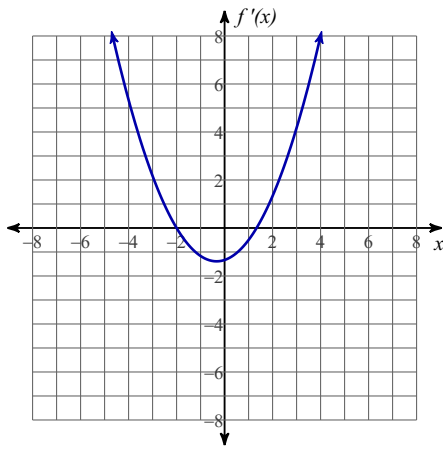
8)



9)



10)



**For each problem, find the instantaneous rate of change of the function at the given value.**

11)  $g(w) = 2w^2 + 2$ ;  $-1$

12)  $g(r) = -r^2 + 1$ ;  $-1$

13)  $y = x^2 + 2$ ;  $0$

14)  $f = 2t^2 + t + 1$ ;  $0$

**For each problem, find the equation of the tangent line to the function at the given point.**

15)  $r = s^2 + s - 2$ ;  $(-2, 0)$

16)  $y = s^2 + 2s + 2$ ;  $(-1, 1)$

$$17) f(s) = 2s^2 + 2; (-1, 4)$$

$$18) h(x) = x^2 + x + 2; (0, 2)$$

**Differentiate each function with respect to the given variable.**

$$19) h(s) = 2s^5$$

$$20) f(w) = 4w^4$$

$$21) t = 3x^{-2}$$

$$22) g = 2t^{-5}$$

$$23) h(x) = -3x^4 + 3x^{-3}$$

$$24) y = -\frac{3}{4}r^5 + 3r^{-2}$$

$$25) f(t) = \frac{5}{4}t^2 + 5t^{-5}$$

$$26) h = r^4 - 4r^{-1}$$

$$27) h(w) = 3w^5 - 5w^{\frac{3}{5}} + 5w^{-2}$$

$$28) y = 4r^3 + \frac{1}{2}r^{\frac{1}{4}} + \frac{5}{2}r^{-2}$$

$$29) h(r) = 5r^3 - \frac{2}{3}r^2 + \frac{2}{5}r^{\frac{2}{5}}$$

$$30) f = 3t - \frac{5}{4}t^{\frac{3}{4}} - \frac{1}{5}t^{\frac{3}{5}}$$

$$31) h(w) = (5w^5 + 5) \cdot 5w^4$$

$$32) f = 5r^5(r^3 + 3)$$

$$33) s = (2t^4 - 5) \cdot 5t^5$$

$$34) g = (4s^3 + 5)s^2$$

$$35) h = (3s^3 + 5)(3s^2 + 5)$$

$$36) h = (t^2 + 4)(4t^4 - 2)$$

$$37) f = (-4t^5 + 2)(3t^3 - 5)$$

$$38) h(r) = (-3r^3 + 2)(-2r^4 + 5)$$

$$39) f = (3 - 2x^{-5})(5x^2 + 1)$$

$$40) t = \left(5s^{\frac{3}{4}} - 2\right)(5s^3 - 2)$$

$$41) h(r) = (\sqrt[3]{r^2} + 2)(-3r^5 + 2)$$

$$42) f(t) = \left(4t^{\frac{4}{3}} + 5\right)(2t^3 + 5)$$

$$43) t = \frac{2s^3}{2s^5 + 5}$$

$$44) y = \frac{5s^2}{4s^4 - 4}$$

$$45) h(t) = \frac{2t^2}{4t^3 + 3}$$

$$46) y = \frac{5x^3}{x^5 + 3}$$



$$47) f(s) = \frac{2s^3 - 5}{3s^3 + 2}$$

$$48) h(r) = \frac{r^5 + 3}{3r^3 + 3}$$

$$49) t = \frac{5x^5 + 5}{4x^2 - 2}$$

$$50) f(s) = \frac{5s^3 + s^2}{5s^4 - 4}$$

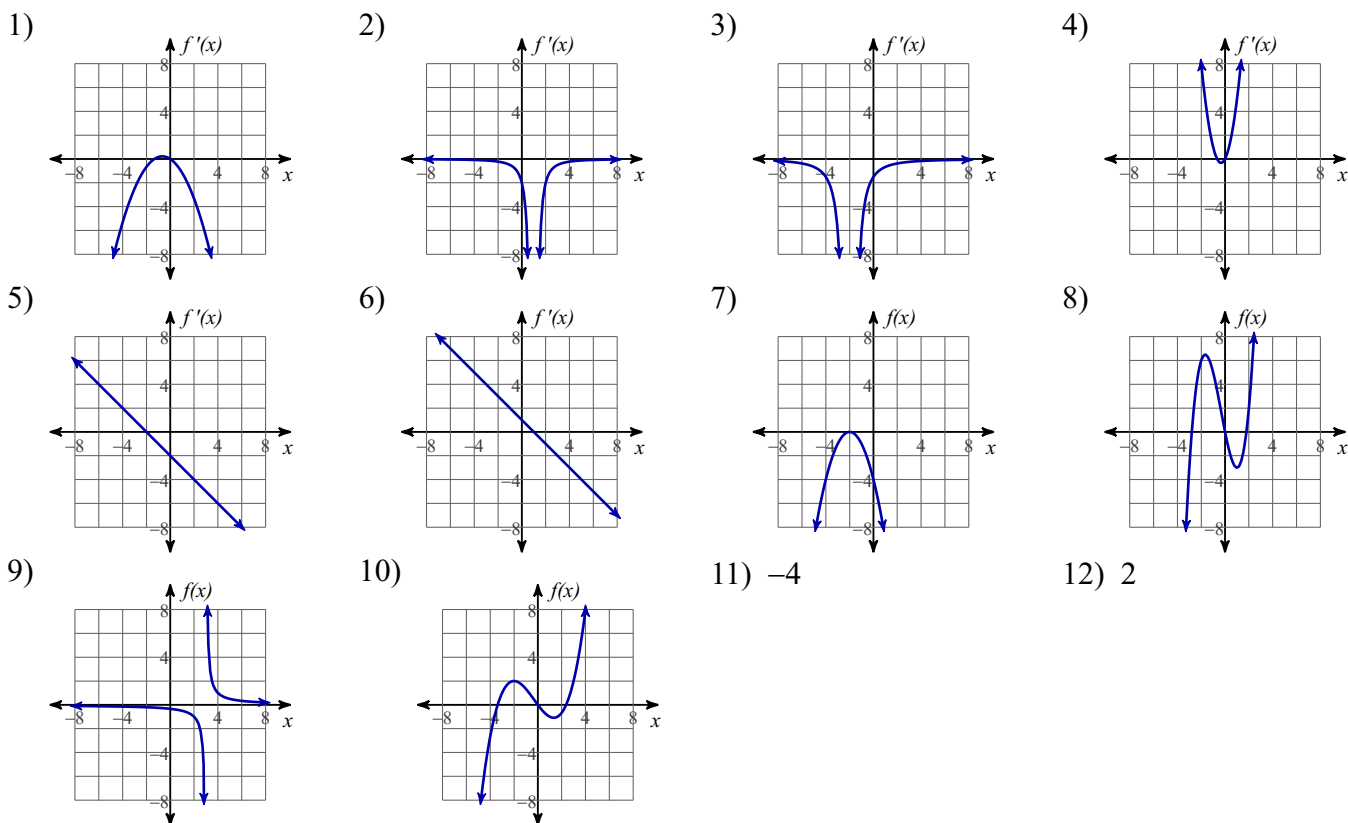
$$51) f = \frac{3r^5 + 4r^2}{4\sqrt[4]{r+2}}$$

$$52) h(x) = \frac{x^5 + 2x^3}{4\sqrt[3]{x+2}}$$

$$53) s = \frac{4t^5 - 5t^3}{4t^{\frac{4}{3}} + 3}$$

$$54) f(s) = \frac{5s^3 + 2}{5 + \frac{3}{s^5}}$$

## Answers to Worksheet 2A (ID: 1)



- 11)  $-4$       12)  $2$
- 13)  $0$       14)  $1$       15)  $y = -3s - 6$       16)  $y = 1$
- 17)  $y = -4s$       18)  $y = x + 2$       19)  $h'(s) = 10s^4$       20)  $f'(w) = 16w^3$
- 21)  $\frac{dt}{dx} = -6x^{-3}$       22)  $\frac{dg}{dt} = -10t^{-6}$       23)  $h'(x) = -12x^3 - \frac{9}{x^4}$       24)  $\frac{dy}{dr} = -\frac{15r^4}{4} - \frac{6}{r^3}$
- 25)  $f'(t) = \frac{5t}{2} - \frac{25}{t^6}$       26)  $\frac{dh}{dr} = 4r^3 + \frac{4}{r^2}$       27)  $h'(w) = 15w^4 - \frac{3}{w^5} - \frac{10}{w^3}$
- 28)  $\frac{dy}{dr} = 12r^2 + \frac{1}{8r^4} - \frac{5}{r^3}$       29)  $h'(r) = 15r^2 - \frac{4r}{3} + \frac{4}{25r^5}$       30)  $\frac{df}{dt} = 3 - \frac{15}{16t^4} - \frac{3}{25t^5}$
- 31)  $h'(w) = (5w^5 + 5) \cdot 20w^3 + 5w^4 \cdot 25w^4$       32)  $\frac{df}{dr} = 5r^5 \cdot 3r^2 + (r^3 + 3) \cdot 25r^4$
- 33)  $\frac{ds}{dt} = (2t^4 - 5) \cdot 25t^4 + 5t^5 \cdot 8t^3$       34)  $\frac{dg}{ds} = (4s^3 + 5) \cdot 2s + s^2 \cdot 12s^2$
- 35)  $\frac{dh}{ds} = (3s^3 + 5) \cdot 6s + (3s^2 + 5) \cdot 9s^2$       36)  $\frac{dh}{dt} = (t^2 + 4) \cdot 16t^3 + (4t^4 - 2) \cdot 2t$
- 37)  $\frac{df}{dt} = (-4t^5 + 2) \cdot 9t^2 + (3t^3 - 5) \cdot -20t^4$       38)  $h'(r) = (-3r^3 + 2) \cdot -8r^3 + (-2r^4 + 5) \cdot -9r^2$
- 39)  $\frac{df}{dx} = (3 - 2x^{-5}) \cdot 10x + (5x^2 + 1) \cdot 10x^{-6}$       40)  $\frac{dt}{ds} = \left(5s^{\frac{3}{4}} - 2\right) \cdot 15s^2 + (5s^3 - 2) \cdot \frac{15}{4}s^{-\frac{1}{4}}$
- 41)  $h'(r) = \left(r^{\frac{2}{3}} + 2\right) \cdot -15r^4 + (-3r^5 + 2) \cdot \frac{2}{3}r^{-\frac{1}{3}}$       42)  $f'(t) = \left(4t^{\frac{4}{3}} + 5\right) \cdot 6t^2 + (2t^3 + 5) \cdot \frac{16}{3}t^{\frac{1}{3}}$
- 43)  $\frac{dt}{ds} = \frac{(2s^5 + 5) \cdot 6s^2 - 2s^3 \cdot 10s^4}{(2s^5 + 5)^2}$       44)  $\frac{dy}{ds} = \frac{(4s^4 - 4) \cdot 10s - 5s^2 \cdot 16s^3}{(4s^4 - 4)^2}$

$$45) h'(t) = \frac{(4t^3 + 3) \cdot 4t - 2t^2 \cdot 12t^2}{(4t^3 + 3)^2}$$

$$47) f'(s) = \frac{(3s^3 + 2) \cdot 6s^2 - (2s^3 - 5) \cdot 9s^2}{(3s^3 + 2)^2}$$

$$49) \frac{dt}{dx} = \frac{(4x^2 - 2) \cdot 25x^4 - (5x^5 + 5) \cdot 8x}{(4x^2 - 2)^2}$$

$$51) \frac{df}{dr} = \frac{\left(4r^{\frac{1}{4}} + 2\right)(15r^4 + 8r) - (3r^5 + 4r^2) \cdot r^{-\frac{3}{4}}}{\left(4r^{\frac{1}{4}} + 2\right)^2}$$

$$52) h'(x) = \frac{\left(4x^{\frac{1}{3}} + 2\right)(5x^4 + 6x^2) - (x^5 + 2x^3) \cdot \frac{4}{3}x^{-\frac{2}{3}}}{\left(4x^{\frac{1}{3}} + 2\right)^2}$$

$$53) \frac{ds}{dt} = \frac{\left(4t^{\frac{4}{3}} + 3\right)(20t^4 - 15t^2) - (4t^5 - 5t^3) \cdot \frac{16}{3}t^{\frac{1}{3}}}{\left(4t^{\frac{4}{3}} + 3\right)^2}$$

$$54) f'(s) = \frac{(5 + 3s^{-5}) \cdot 15s^2 - (5s^3 + 2) \cdot -15s^{-6}}{(5 + 3s^{-5})^2}$$

$$46) \frac{dy}{dx} = \frac{(x^5 + 3) \cdot 15x^2 - 5x^3 \cdot 5x^4}{(x^5 + 3)^2}$$

$$48) h'(r) = \frac{(3r^3 + 3) \cdot 5r^4 - (r^5 + 3) \cdot 9r^2}{(3r^3 + 3)^2}$$

$$50) f'(s) = \frac{(5s^4 - 4)(15s^2 + 2s) - (5s^3 + s^2) \cdot 20s^3}{(5s^4 - 4)^2}$$