Directions: Find the derivative. Use correction symbolism.

36. $y = 3x^2$

35.
$$f(x) = 2x - 5$$

$$f'(x)=2$$
 $\frac{dy}{dx}=6x$

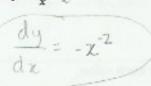
37.
$$g(x) = x^3 - \frac{2}{5}x^2$$

37.
$$g(x) = x^3 - \frac{2}{5}x^2$$
 38. $f(t) = -2t^2 - 3t + 2$

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

Directions: Differentiate each function. Show steps with correct symbolism.

39.
$$y = \frac{1}{y} = \chi^{-1}$$



40.
$$f(x) = x^2 - \frac{4}{x^2} = z^2 - 4z^{-2}$$
 41. $y = (2x - 1)^2 = 4z^2 + 4z + 1$

41.
$$y = (2x-1)^2 = 4 \chi^2 + 4 \chi + 1$$

42.
$$y = \frac{\sqrt{x}}{x} = x^{\frac{1}{2}} x^{\frac{4}{2}} = x^{-\frac{1}{2}}$$

43.
$$g(x) = x(x^2 + 1) = x^2 + 2$$

44.
$$y = \frac{x^2 - x - 1}{\sqrt{x}} = \chi^{\frac{3}{2}} - \chi^{\frac{1}{2}} - \chi^{-\frac{1}{2}}$$

$$\frac{dy}{d\chi} = \frac{3}{2} \chi^{\frac{1}{2}} - \frac{1}{2} \chi^{-\frac{1}{2}} + \frac{1}{2} \chi^{-\frac{3}{2}}$$

Directions: Find the indicated value or expression. Show steps with correct symbolism.

45.
$$y = 3x^2, y^* = ($$

45.
$$y = 3x^2, y^* = (46. \ f(x) = \sqrt{x} + 2, f'(4) = \frac{1}{4} \ 47. \ \frac{d}{dx}(x^3 + 5) = 3z^2$$

16.
$$f(x) = \sqrt{x} + 2$$
, $f(x) = \frac{4}{4}$ 47. $\frac{1}{dx}(x^2)$

$$\frac{\sqrt{2} + 2 - 4}{\sqrt{x} + 4} = \frac{\sqrt{2} - 2}{x + 4} = \frac{\sqrt{2}}{\sqrt{2} + 4} = \frac{\sqrt{2}}{\sqrt{2}}$$

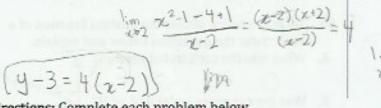
$$\frac{1}{\sqrt{2}} = \frac{1}{4}$$

48.
$$f^{(3)}(x) = 2x - 1$$
, $f^{(5)}(3) = \frac{1}{2}$
 $f^{(5)}(x) = \frac{1}{2}$

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Directions: Find an equation of a line with the following characteristics.

49. Tangent to graph of $f(x) = x^2 - 1$ at (2,3)



50. Tangent to $f(x) = \frac{2}{x}$, when x = 1

$$\frac{\frac{1}{2}-2}{x-1} = \frac{\frac{2-2x}{x}}{x-1} = \frac{2(x-1)}{x(x-1)} = -2$$

Directions: Complete each problem below.

51. Find the x-values of all points where the graph of

$$f(x) = 3x^3 + 2x - 2$$
 has a slope of 11

$$f(x) = 3x^{3} + 2x - 2 \text{ has a slope of } 11$$

$$f'(x) = 9x^{2} + 2$$

$$0 = 9x^{2} - 9$$

$$0 = 9x^{2} - 9$$

52. Find the x-values of all points where the graph of $y = x^4 - 3x^2 + 2$ has a horizontal tangent line $2x^2 = 0$

$$y' = 4z^3 - 6x$$
 $0 = 2x(2x^2 - 3)$ $2z = 3$ $(x = 0)$ $2\sqrt{3}$ $x^2 = 3$

53. Find the x-values of all points where the graph of $y = x^4 - 3x^2 + 2$ has a horizontal tangent line

$$y'=4x^2-6x$$
 $0=2x(2x^2-3)$
 $(x=0,\pm\sqrt{\frac{3}{2}})$

54. Find the average rate of change of the function $f(x) = 3x^3 - 4$

$$\frac{f(4) - f(2)}{4 - 2} = \frac{\text{between } x = 2 \text{ and } x = 4}{2}$$

55. Find the instantaneous rate of change of the function $f(x) = 3x^3 - 4$ at x = 3

$$f'(x) = 9x^2 - 4at x = 3$$

 $f'(x) = 9x^2 + f'(3) = 60$

56. Find the rate of change of $y = \frac{x}{x+2}$ on [1,4]

