

7.

$$\int \frac{x \, dx}{\sqrt{3x^2 + 5}}$$

$$u = 3x^2 + 5$$

$$\frac{du}{6x} = \cancel{6x} \, dx$$

$$\int \cancel{x} u^{\frac{1}{2}} \frac{du}{\cancel{6x}}$$

$$\frac{1}{6} \int u^{-\frac{1}{2}} \, du$$

$$2 \cdot \frac{1}{6} u^{\frac{1}{2}} + C$$

$$2xy - y^2$$

$$- 2y \frac{dy}{dx}$$

$$10. \int_0^k (2kx - x^2) dx = 18$$

$$\left( 2k \frac{x^2}{2} - \frac{x^3}{3} \right)_0^k = 18$$

$$\left( kx^2 - \frac{x^3}{3} \right)_0^k = 18$$

$$\left( k^3 - \frac{k^3}{3} \right) - (0) = 18$$

$$\frac{2}{3} k^3 = 18 \cdot \frac{3}{2}$$

$$k^3 = 27$$

$$k = 3$$

$$11. \quad y = x(1-2x)^3 \quad (1, -1)$$

$$\frac{dy}{dx} = x(3(1-2x)^2 \cdot -2) + (1-2x)^3$$

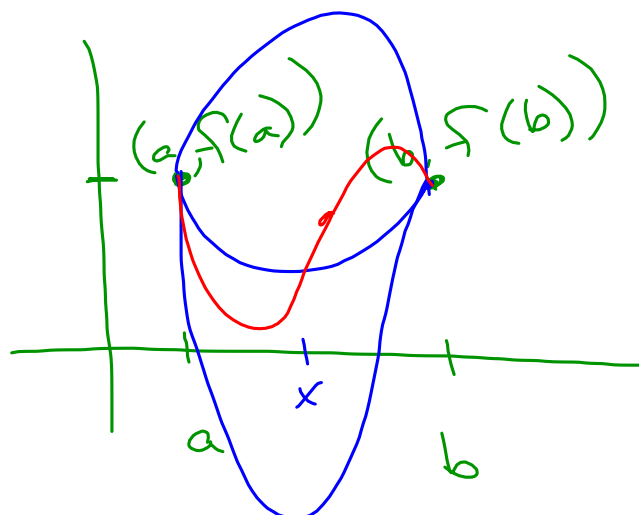
$$y = -7(x-1) - 1$$

$$y = -7x + 6$$

$$f(x) = (2x)^{\frac{1}{2}}$$

$$f'(x) = \frac{1}{2}(2x)^{-\frac{1}{2}} \cdot 2$$

$$(2 \cdot 2)^{-\frac{1}{2}} = \frac{1}{(4)^{\frac{1}{2}}} = \frac{1}{2}$$



22.

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

$$\ln\left(\frac{x}{\frac{1}{x}}\right) = 2$$

$$\frac{\ln x^2}{2} = \frac{2}{2}$$

$$e^2 = x^2$$

$$\ln x = 1$$

$$\frac{d}{dx} (x^{\ln x})$$

$$\ln y = \ln x^{\ln x}$$

$$\ln y = \ln x \cdot \ln x$$

$$\ln y = (\ln x)^2$$

$$\frac{dy}{y} = 2(\ln x) \left(\frac{1}{x}\right) \cdot y$$

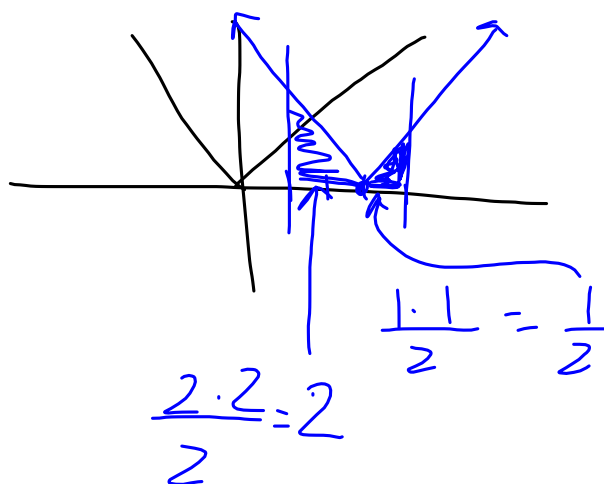
$$\begin{aligned} \frac{dy}{dx} &= \frac{2 \ln x \cdot y}{x} \\ &= \frac{2 \ln x}{x} (x^{\ln x}) \end{aligned}$$

$$f(x) = \int_1^x \frac{1}{t} dt$$

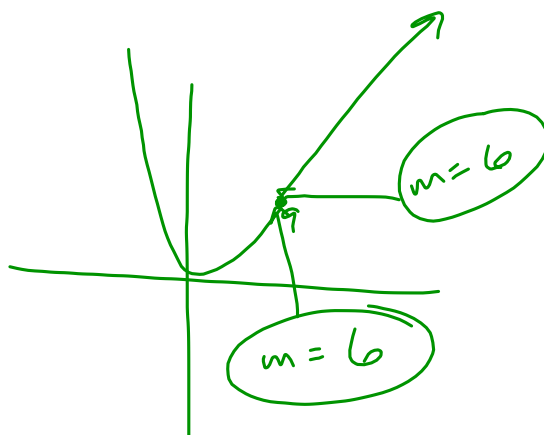
$$f'(x) = \frac{1}{x} \cdot 1 = \frac{1}{x}$$

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\tan 3x$$



27.



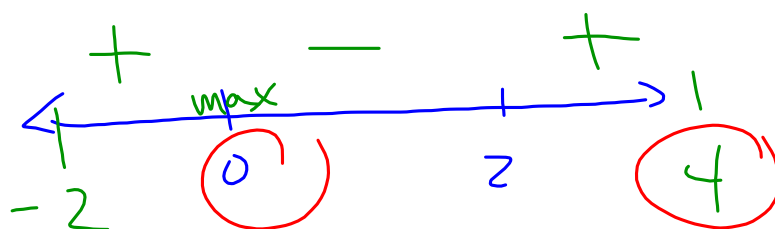
33.

$$y = x^3 - 3x^2 + 12$$

$$y' = 3x^2 - 6x = 0$$

$$3x(x-2) = 0$$

$$x = 0, 2$$



36.

$$\int_a^b$$

$$b - a$$

$$\frac{1}{b-a} \int_a^b$$

$$\frac{1}{3-0} \int_0^3 3x - x^2 dx$$

38.

$$\int \frac{1}{x} \int_1^x \frac{1}{u} du$$

$$\ln u \Big|_1^x =$$

$$\ln x$$

$$\int \frac{1}{x} \ln x dx$$

$$u = \ln x$$

$$du = \frac{1}{x} dx$$

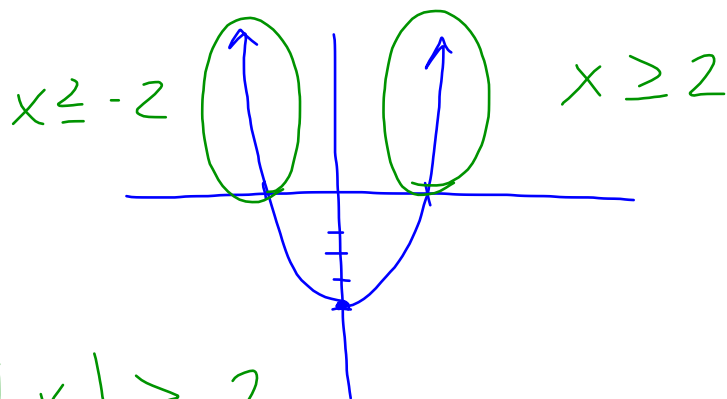
$$\int u du$$

$$\frac{u^2}{2} + C$$



2.  $| | < \text{"hand"} \quad x^2 - 4$

$| | > \text{"great" or "}$

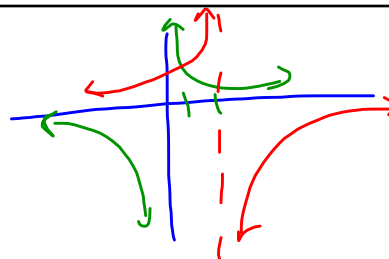


$|x| \geq 2$

$x \leq -2 \quad \text{or} \quad x \geq 2$

4.

$$\frac{-5}{x-2}$$



$$-5(x-2)^{-1}$$

$$y' = 5(x-2)^{-2}$$

$$y'' = -10(x-2)^{-3}$$

$$\frac{-10}{(x-2)^3}$$

7.

$$\int \frac{x \, dx}{\sqrt{3x^2 + 5}}$$

$$u = 3x^2 + 5$$

$$\frac{du}{6x} = \cancel{6x} \, dx$$

$$\int u^{-\frac{1}{2}} \frac{du}{6} = \frac{1}{6} \int u^{-\frac{1}{2}} \, du$$

$$\frac{1}{6} \left( 2 u^{\frac{1}{2}} \right) + C$$

$$10. \int_0^k (2kx - x^2) \, dx = 18$$

$$2k \frac{x^2}{2} - \frac{x^3}{3} \Big|_0^k = 18$$

$$k^3 - \frac{k^3}{3} - (0) = 18$$

$$\frac{2}{3} k^3 = 18 \cdot \frac{3}{2}$$

$$k^3 = 27$$

$$k = 3$$

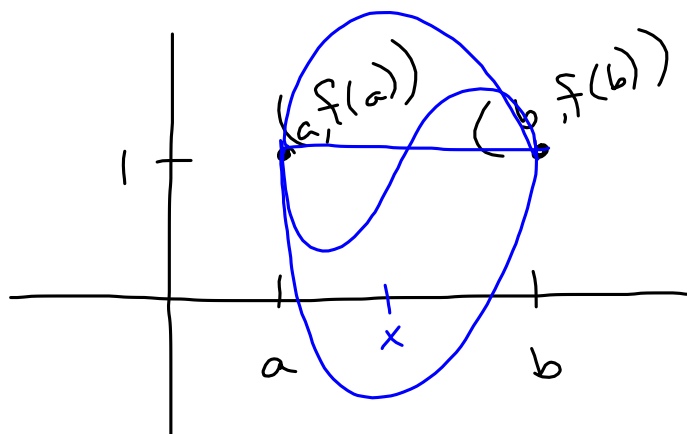
$$11. \quad y = x(1 - 2x)^3 \quad (1, -1)$$

$$y' = x(3(1 - 2x)^2(-2)) + (1 - 2x)^3$$

$$m = -7$$

$$y = -7(x - 1) - 1$$

$$y = m(x - x_1) + y_1$$



22.

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

$$\ln\left(\frac{x}{\frac{1}{x}}\right) = 2$$

$$\ln x^2 = \frac{2}{2} \quad e^2 = x^2$$

$$\ln x = 1$$

24.

$$\ln y = \ln x \cdot \ln x$$

$$\ln y = \ln x \cdot \ln x$$

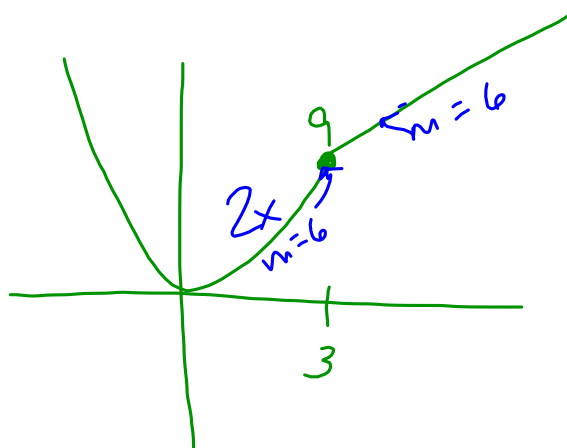
$$\ln y = (\ln x)^2$$

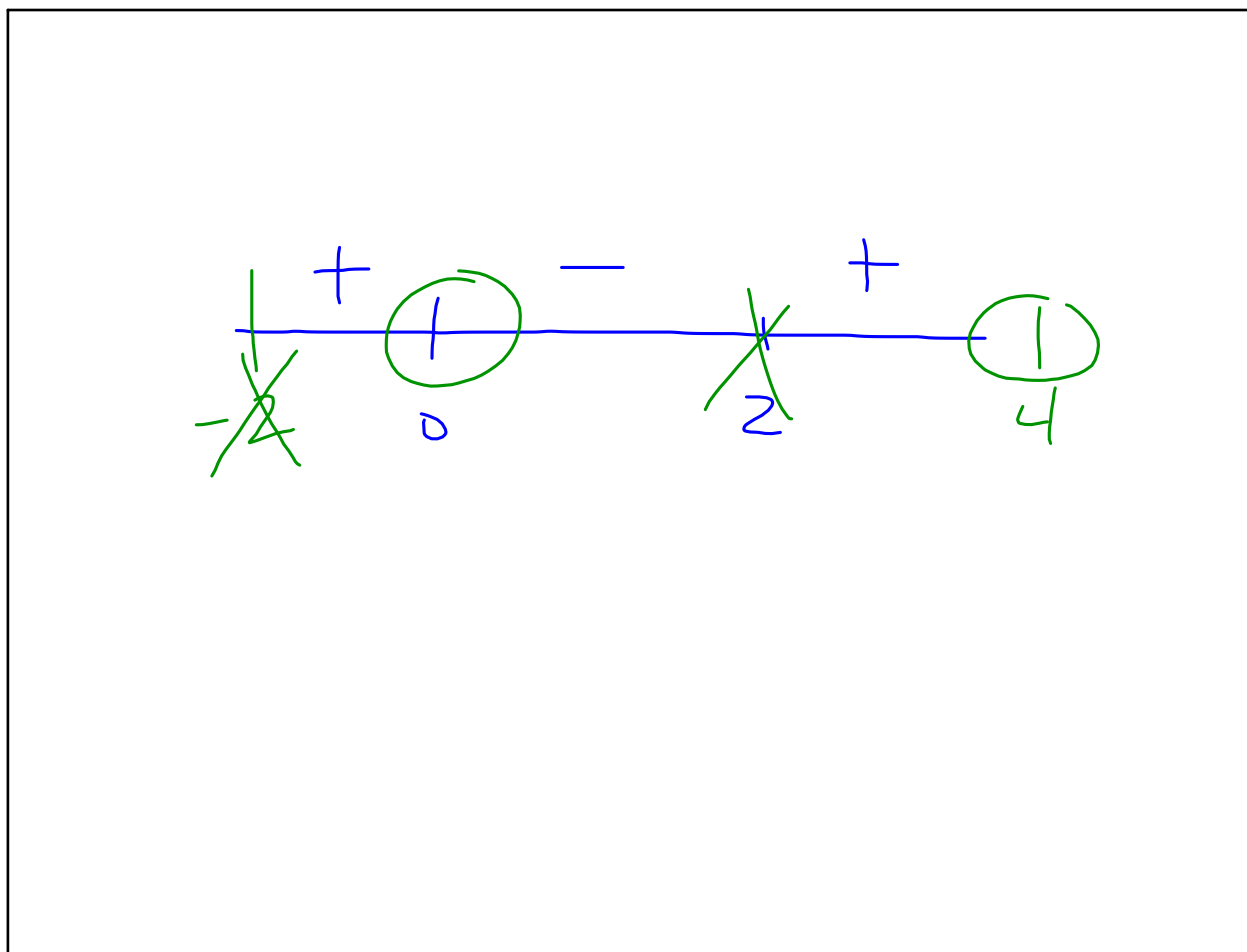
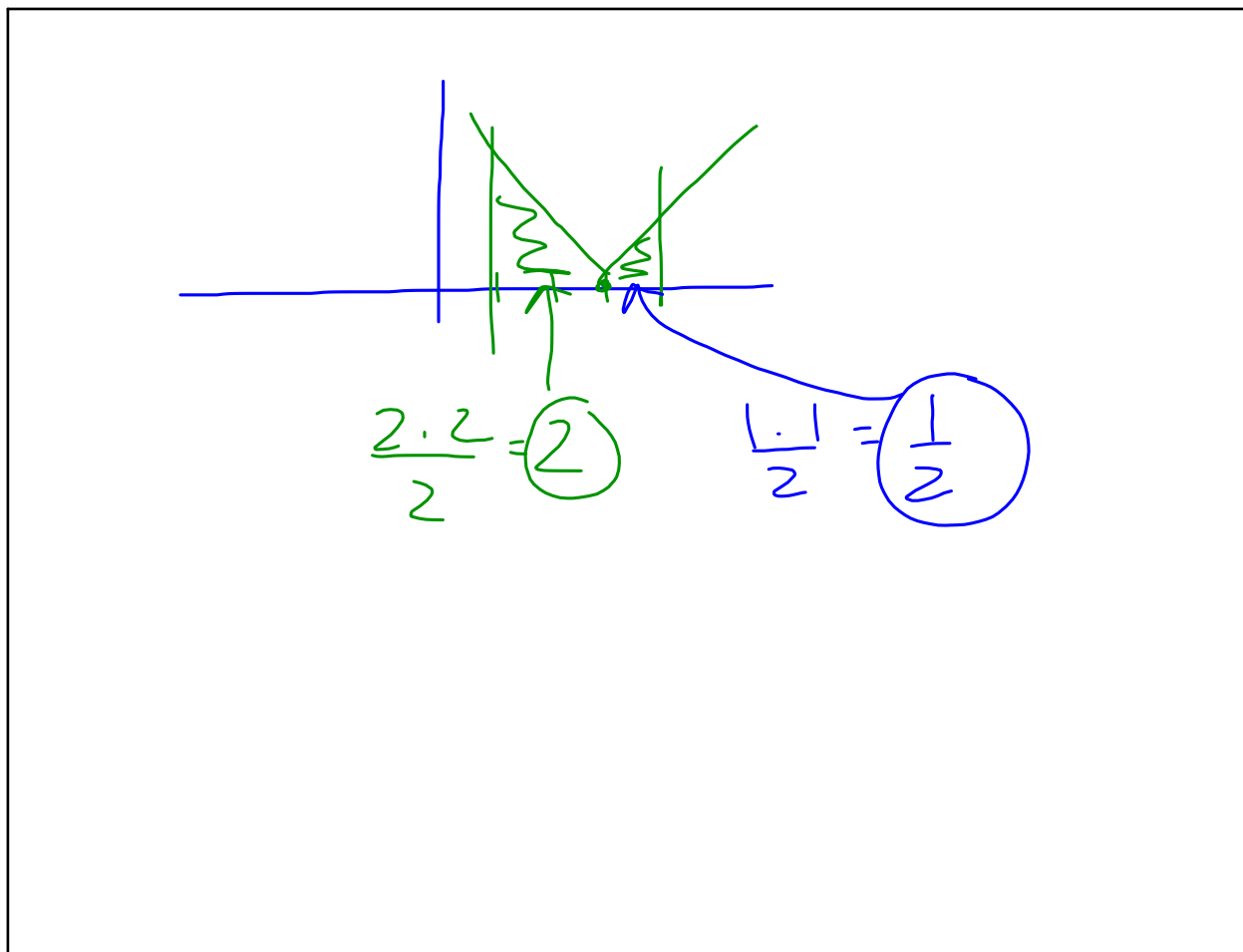
$$\frac{dy}{dx} = 2 \ln x \cdot \frac{1}{x} (y)$$

$$\frac{2}{x} \ln x \cdot x^{\ln x}$$

$$f(x) = \int_{-1}^x \frac{1}{t} dt$$

$$f'(x) = \frac{1}{x} = 1 \cdot \frac{1}{x} = 0$$





36.

$$\frac{\int_a^b f(x) dx}{b-a}$$

$$\frac{1}{b-a} \int_a^b f(x) dx$$

$$\frac{1}{3-0} \int_0^3 (3x - x^2) dx$$

38.

$$\int \frac{1}{u} du$$

$$\ln u \Big|_1^x$$

$$\ln x - \ln 1$$

$$\int \frac{1}{x} (\ln x) dx$$

$$u = \ln x$$

$$du = \frac{1}{x} dx$$

$$\int u du$$

$$\frac{u^2}{2} + C$$