Period 3, March 17, 2025

$\frac{dy}{dx} = 2x - y.$

$(0,1) \Rightarrow 2(0) - 1 = -1$

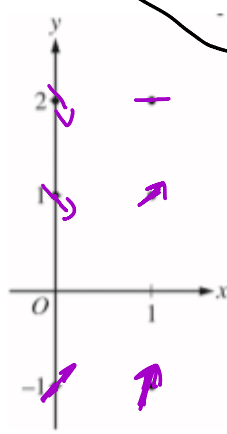
$(1,1) \Rightarrow 2(1) - 1 = 1$

$(1,2) \Rightarrow 2(1) - 2 = 0$

$(0,-1) \Rightarrow 2(0) - (-1) = 1$

$(1,-1) \Rightarrow 2(1) - (-1) = 3$

$(0,2) \Rightarrow 2(0) - 2 = -2$



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

$$\frac{d^2y}{dx^2} = 2 - \frac{dy}{dx} = 2 - (2x - y)$$
$$= 2 - 2x + y$$

$+ = 2 - 2(-1) + 2$

concave up

(2, 3) is a point

$\frac{dy}{dx} = 0$ or $\varnothing$ for max/min

$\frac{dy}{dx} = 2x - y = 2 \cdot 2 - 3$
$= 1$

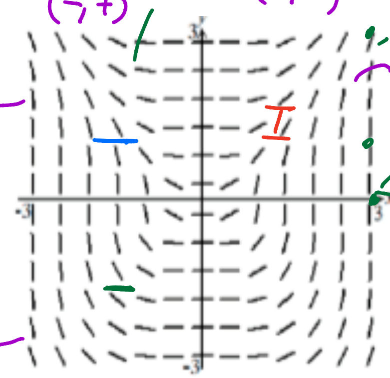
concave up

(−, +) (+, +)

m = −

m = +

(3, 0)



= m = +

m = −

(−, −) (+, −)

(A) $\cancel{\frac{dy}{dx} = \frac{x}{y}}$ ✓ ✓

(B) $\cancel{\frac{dy}{dx} = \frac{x^2}{y^2}}$ ✓

(C) $\cancel{\frac{dy}{dx} = \frac{x^3}{y}}$ ✓ ✓

(D) $\cancel{\frac{dy}{dx} = \frac{x^2}{y}}$ ✓

(E) $\frac{dy}{dx} = \frac{x^3}{y^2}$ ✓ ✓ ✓

$$\lim_{x \to 0^+} \frac{\ln 2x}{2x} = \frac{-\infty}{+RSN} = -\infty$$

$$\frac{\ln 0}{0} = \frac{1}{0} = \phi$$

$\ln x = y$

$e^y = x$

$e^{-100} = \frac{1}{e^{100}} \approx 0$

Let f be a function defined by $f(x) = \begin{cases} 1 - 2\sin x & \text{for } x \le 0 \\ e^{-4x} & \text{for } x > 0. \end{cases}$

$[-1, 0]$

$[0, 1]$

(a) Show that f is continuous at $x = 0$.

(b) For $x \neq 0$, express $f'(x)$ as a piecewise-defined function. Find the value of x for which $f'(x) = -3$.

(c) Find the average value of f on the interval $[-1, 1]$.

$1 - 2\sin 0 = 1 - 2 \cdot 0 = 1$

$e^{-4(0)} = e^0 = 1$

a

$\lim_{x \to 0} (1 - 2\sin x) = 1$

$\lim_{x \to 0} e^{-4x} = 1$

$F(0) = 1 - 2\sin(0) = 1$

$F(0) = \lim_{x \to 0}$

$1 = 1$

b

Range $[-2, 2]$

$$F'(x) = \begin{cases} 0 - 2\cos x & \text{For } x \le 0 \\ e^{-4x} \cdot -4 & \text{For } x > 0 \end{cases}$$

$$\frac{-3}{-4} = \frac{e^{-4x} \cdot -4}{-4}$$

$$+\frac{3}{4} = e^{-4x}$$

$$\ln \frac{3}{4} = \ln e^{-4x}$$

$$\frac{\ln \frac{3}{4}}{-4} = \frac{-4x \cdot \cancel{\ln e}}{-4}$$