

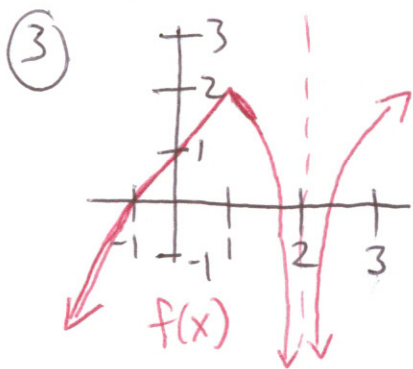
$$\textcircled{1} \lim_{x \rightarrow 4} \frac{\sqrt{x+5} - 3}{x-4}$$

$$\lim_{x \rightarrow 4} \frac{(\sqrt{x+5} - 3)(\sqrt{x+5} + 3)}{(x-4)(\sqrt{x+5} + 3)} = \lim_{x \rightarrow 4} \frac{\cancel{x-4} - 9}{(\cancel{x-4})(\sqrt{x+5} + 3)}$$

$$\lim_{x \rightarrow 4} \frac{1}{\sqrt{x+5} + 3} = \frac{1}{\sqrt{4+5} + 3} = \frac{1}{3+3} = \boxed{\frac{1}{6}}$$

$$\textcircled{2} \lim_{x \rightarrow 5} \frac{5-x}{2x^2-50}$$

$$\lim_{x \rightarrow 5} \frac{-1(\cancel{x-5})}{2(\cancel{x+5})(x+5)} = \lim_{x \rightarrow 5} \frac{-1}{2(x+5)} = \frac{-1}{2(5+5)} = \boxed{\frac{-1}{20}}$$



a) $\lim_{x \rightarrow 1} f(x)$

b) $\lim_{x \rightarrow 2} f(x)$

c) $\lim_{x \rightarrow 2^+} f(x)$

d) Where is $f(x)$ NOT Differentiable?

a) 2

b) $-\infty$

c) $-\infty$

d) $x=1 \neq 2$

④ $f(x) = \sin x \tan x$ Find $f'(x)$

$$f'(x) = \cos x \tan x + \sin x \sec^2 x$$

$$\sin x + \sin x \sec^2 x = \sin x (1 + \sec^2 x)$$

⑤ $\csc y - xy = x^3$ Find y'

$$-\csc y \cot y (y') - (1 \cdot y + xy') = 3x^2$$

$$-\csc y \cot y (y') - xy' = 3x^2 + y$$

$$y'(-\csc y \cot y - x) = 3x^2 + y$$

$$-\csc y \cot y - x$$

$$-\csc y \cot y - x$$

$$y' = \frac{3x^2 + y}{-\csc y \cot y - x}$$

⑥ $f(x) = \frac{x^2 - 3}{x}$ Intervals concave down.

$$f(x) = x - 3x^{-1} \quad f'(x) = 1 + 3x^{-2} \quad f''(x) = -6x^{-3}$$

$$\frac{-6}{x^3} = 0$$

$$x = 0$$

$(-\infty, 0)$	$(0, \infty)$
$f''(-1) = +$	$f''(1) = -$

$$(0, \infty)$$

⑦ $f''(x) = -2x^2 - x + 2$ Critical #s are $-2, 0, 5$

What are the relative ~~an~~ inimums?

$$f''(-2) = -2(-2)^2 - (-2) + 2$$

$$f''(0) = -2(0)^2 - (0) + 2$$

$$f''(5) = -2(5)^2 - (5) + 2$$

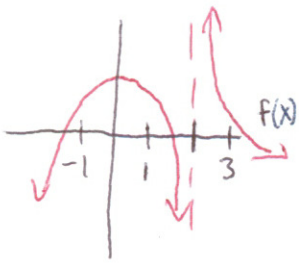
$$f''(-2) = -8 + 2 + 2 = -4$$

$$f''(0) = 2$$

$$f''(5) = -50 - 5 + 2 = -53$$

$$\text{at } x=0$$

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What is the 2nd derivative of $f(x)$
When $x=0$ and when $x=3$?

At $x=0$ $f''(x) < 0$ & At $x=3$ $f''(x) > 0$

9 $\int 3\sec^2 x - \sqrt{x} \, dx$

$$3\tan x - \frac{2x^{3/2}}{3} + C$$

10 $\int_{-3}^1 (4x-3) \, dx$

$$\left[2x^2 - 3x \right]_{-3}^1 = \left(\underset{2-3}{2(1)^2 - 3(1)} \right) - \left(\underset{18+9}{2(-3)^2 - 3(-3)} \right) = -1 - 27 = \boxed{-28}$$

11 $f'(x) = 3x^2 - 2$ $f(1) = 4$ Solve the differential equations

$$\int 3x^2 - 2 \, dx = x^3 - 2x + C$$

$$4 = (1)^3 - 2(1) + C$$

$$4 = -1 + C$$

$$C = 5$$

$$f(x) = x^3 - 2x + 5$$