And Now....

Deep Thoughts, By Jack Handey

"I bet the main reason the police keep people away from a plane crash is they don't want anybody walking in and lying down in the crash stuff, then, when somebody comes up, act like they just woke up and go "What was THAT?!"" - Jack Handey

Source:
https://sites.google.com/site/ashleylparrott/jackhandey.

UNIT 2 REVIEW Day 2

p. 216 # 1, 2, 3, 4, 5,
8, 10, 19, 20

10f)
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$$f(t) = \frac{t^2-3t+2}{t-3}$$

a. Domain $t \in \mathbb{R},\ t \neq 3$

$t=3$

$$\lim_{t\to 3^-} f(t) = -\infty \qquad \lim_{t\to 3^+} f(t) = \infty$$

b. t-intercepts: $f(t)=0$

$$0 = \frac{t^2-3t+2}{t-3}$$

$$0 = \frac{(t-2)(t-1)}{t-3}$$

$t=2$ or $t=1$

$f(t)$-intercepts:

$$f(0) = -\frac{2}{3}$$

MHF4U

Oblique Asymptote: (Numerator 1 degree higher than Denom)

$$\begin{array}{r|l} & t \quad R\ \tfrac{2}{t-3} \\ t-3 & t^2-3t+2 \\ & t^2-3t \\ & \qquad\quad 2 \end{array}$$

$$\therefore f(t) = t + \frac{2}{t-3}$$

Note: It's easier to take the derivative of this to get f'(t)

$$f'(t) = \frac{(2t-3)(t-3)-(1)(t^2-3t+2)}{(t-3)^2}$$

$$= \frac{2t^2-6t-3t+9-t^2+3t-2}{(t-3)^2}$$

$$= \frac{t^2-6t+7}{(t-3)^2}$$

$f(t)=t$ is the oblique asym.

$f'(t)=0$

$$0 = t^2-6t+7$$

$$t = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$= \frac{6\pm\sqrt{36-4(7)}}{2}$$

$$= \frac{6\pm2\sqrt{2}}{2}$$

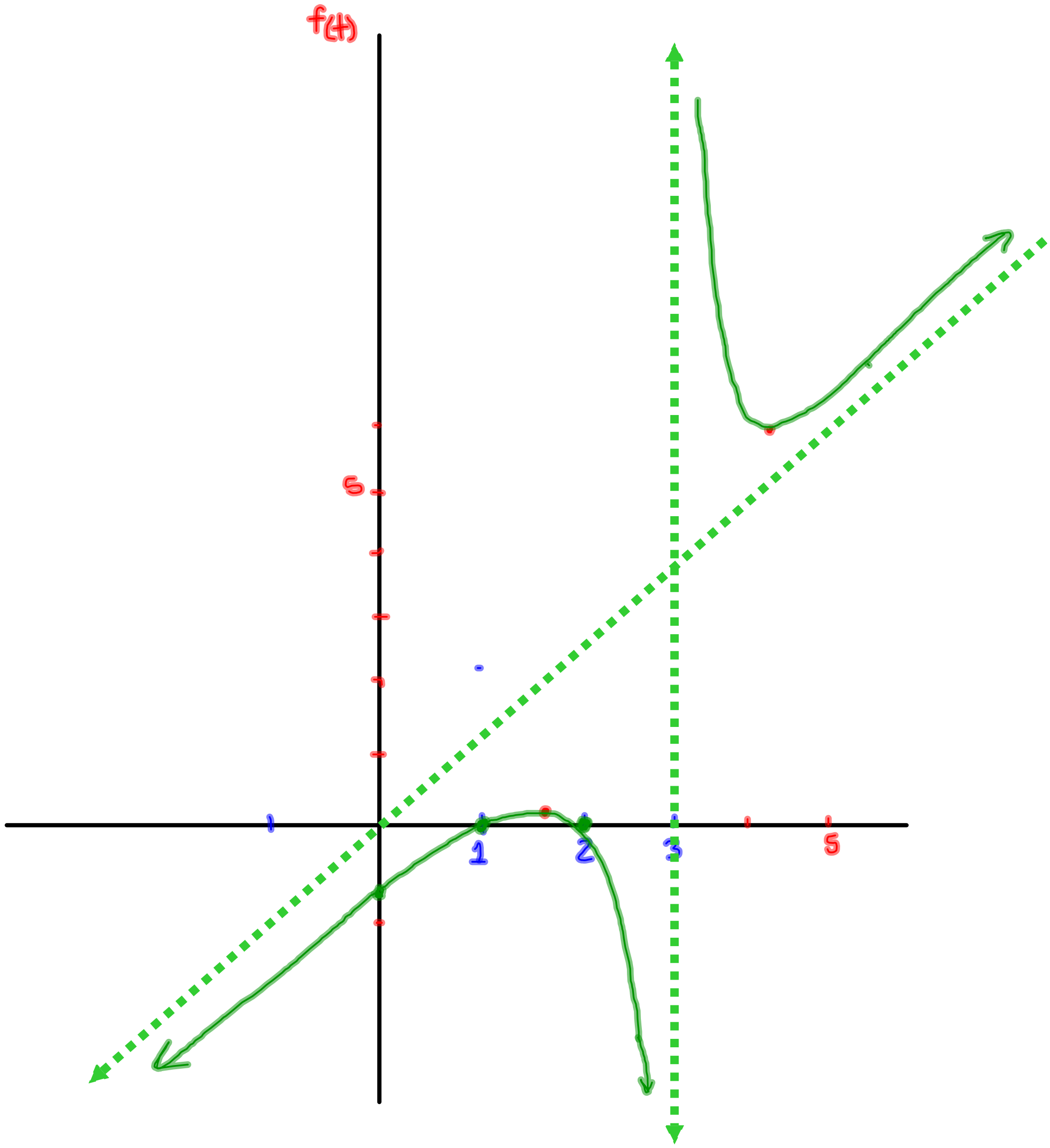
$$= 3\pm\sqrt{2}$$

$t \doteq 4.41$ _or_ $t \doteq 1.59$

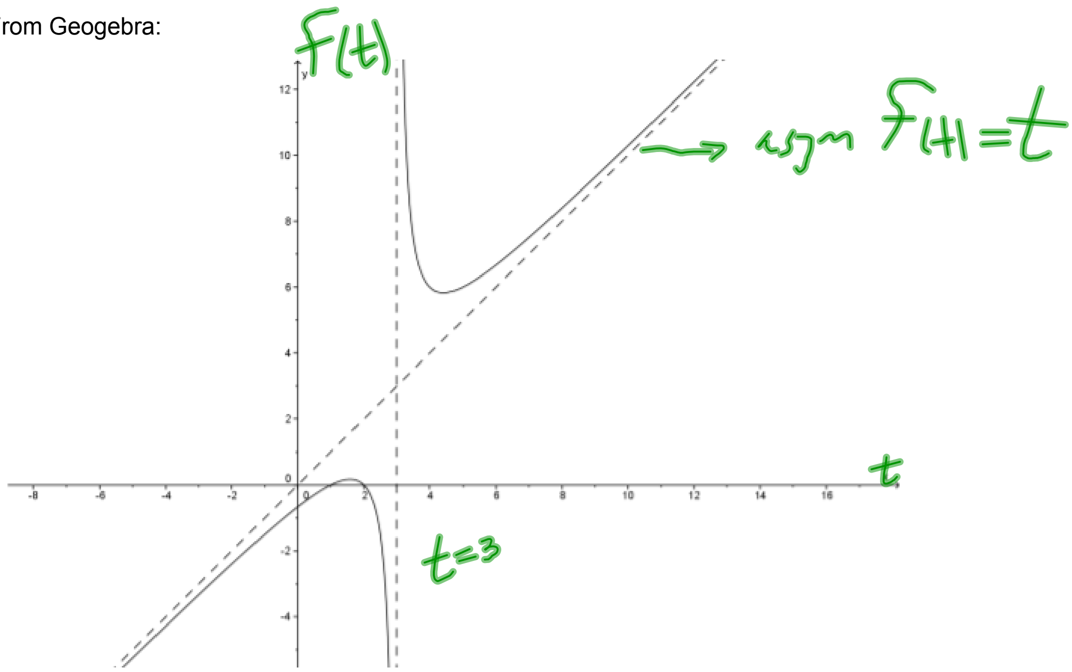
$$\therefore f(4.41) \doteq 4.41 + \frac{2}{4.41-3}$$

$\doteq 5.83$

$\therefore f(1.59) \doteq 0.17$



From Geogebra:



Revisited question from Lesson 4 - "Use the 2nd derivative test to classify critical points

Recall:

The 2nd Derivative Test:

At a local max, f"(x) < 0.
At a local min, f"(x) > 0.

If $f''(x)$ is negative
x is a max

Ex1: Find then classify the critical points of the function
$f(x) = 3x^5 - 25x^3 + 60x$ using the 2nd derivative test.

$f'(x) = 15x^4 - 75x^2 + 60$

$f'(x) = 0$ to find critical values.

$f'(x) = 15(x^4 - 5x^2 + 4)$

$f'(x) = 15(x^2-4)(x^2-1)$

$0 = 15(x^2-4)(x^2-1)$

$x = \pm 2$ OR ± 1

Crit. points:

$f(2), f(-2), f(1), f(-1)$

$f(2) = 16 \qquad f(1) = 38$

$f(-2) = -16 \qquad f(-1) = -38$

The 2nd Deriv Test.

$f''(x) = 60x^3 - 150x$

$f''(-2) < 0 \quad \therefore (-2, -16)$ is a local max.

$f''(2) > 0 \quad \therefore (2, 16)$ is a local min.

$f''(1) < 0 \quad \therefore (1, 38)$ is a local max

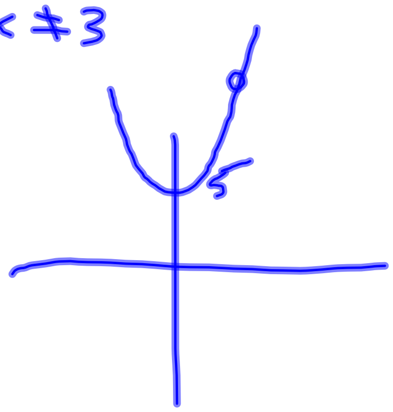
$f''(-1) > 0 \quad \therefore (-1, -38)$ is a local min.

What to do with graphical holes.

$$f(x) = \frac{x^3 - 3x^2 + 5x - 15}{x-3}$$

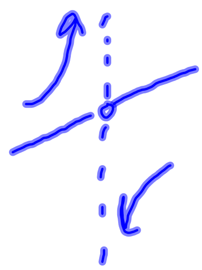
$$= \frac{(x^2+5)\cancel{(x-3)}}{\cancel{(x-3)}}, \quad x \neq 3$$

$$f(x) = x^2 + 5, \quad x \neq 3$$



a. $x \in \mathbb{R}, x \neq 3$

$$f(x) = \frac{\cancel{(x+3)}\,x}{\cancel{(x+3)}(x+3)}$$



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$$f(x) = \frac{5x}{(x-1)^2}, \quad \text{show that } f'(x) = \frac{-5(x+1)}{(x-1)^3}$$

$$\text{and} \quad f''(x) = \frac{100(x+2)}{(x-1)^4}$$

$$F(x) = (x-1)^{4/3}$$