

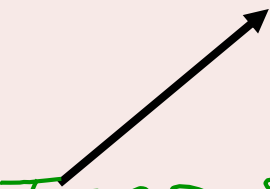
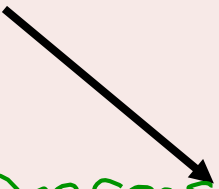
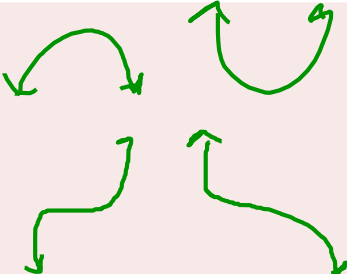

CURVE SKETCHING: SKETCHING f FROM f'

Honors Calculus

Keeper 22



WHAT DOES THE FIRST DERIVATIVE TELL YOU ABOUT $F(x)$?

$F'(x)$	$+$ <i>above x-axis</i>	$-$ <i>below x-axis</i>	0	$F(x)$ defined by undefined at $f'(x)$ critical value
$F(x)$	 <i>Increasing</i>	 <i>Decreasing</i>		



IF 'A' IS A CRITICAL VALUE, WHAT CAN WE TELL ABOUT F(X)?

$F'(x)$	<p>A horizontal line with a vertical tick mark at 'a'. Above the line, the sign is '+' to the left of 'a', '0' at 'a', and '-' to the right of 'a'. Below the line, a green arrow points up from the left towards 'a', and another green arrow points down from the right towards 'a'. The word 'max' is written below 'a'.</p>	<p>A horizontal line with a vertical tick mark at 'a'. Above the line, the sign is '-' to the left of 'a', '0' at 'a', and '+' to the right of 'a'. Below the line, a green arrow points down from the left towards 'a', and another green arrow points up from the right towards 'a'.</p>
$F(x)$	<p>max or undef.</p> <p>A green hand-drawn curve that rises to a peak at 'a' and then falls. A double-headed green arrow is drawn above the peak.</p>	<p>min or undef.</p> <p>A green hand-drawn curve that falls to a valley at 'a' and then rises. A double-headed green arrow is drawn above the valley.</p>

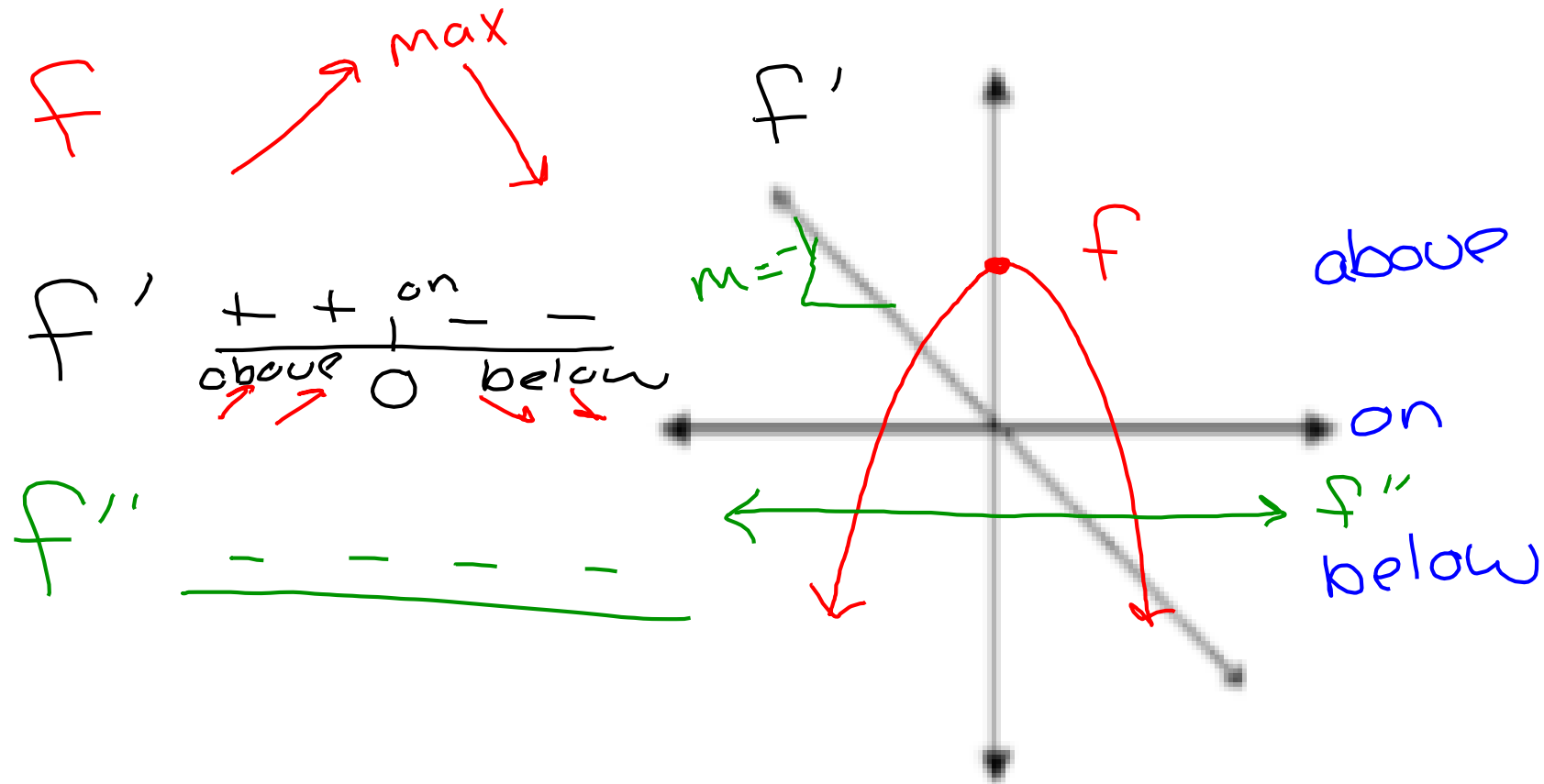


WHAT DOES THE 2ND DERIVATIVE TELL US ABOUT $F(x)$?

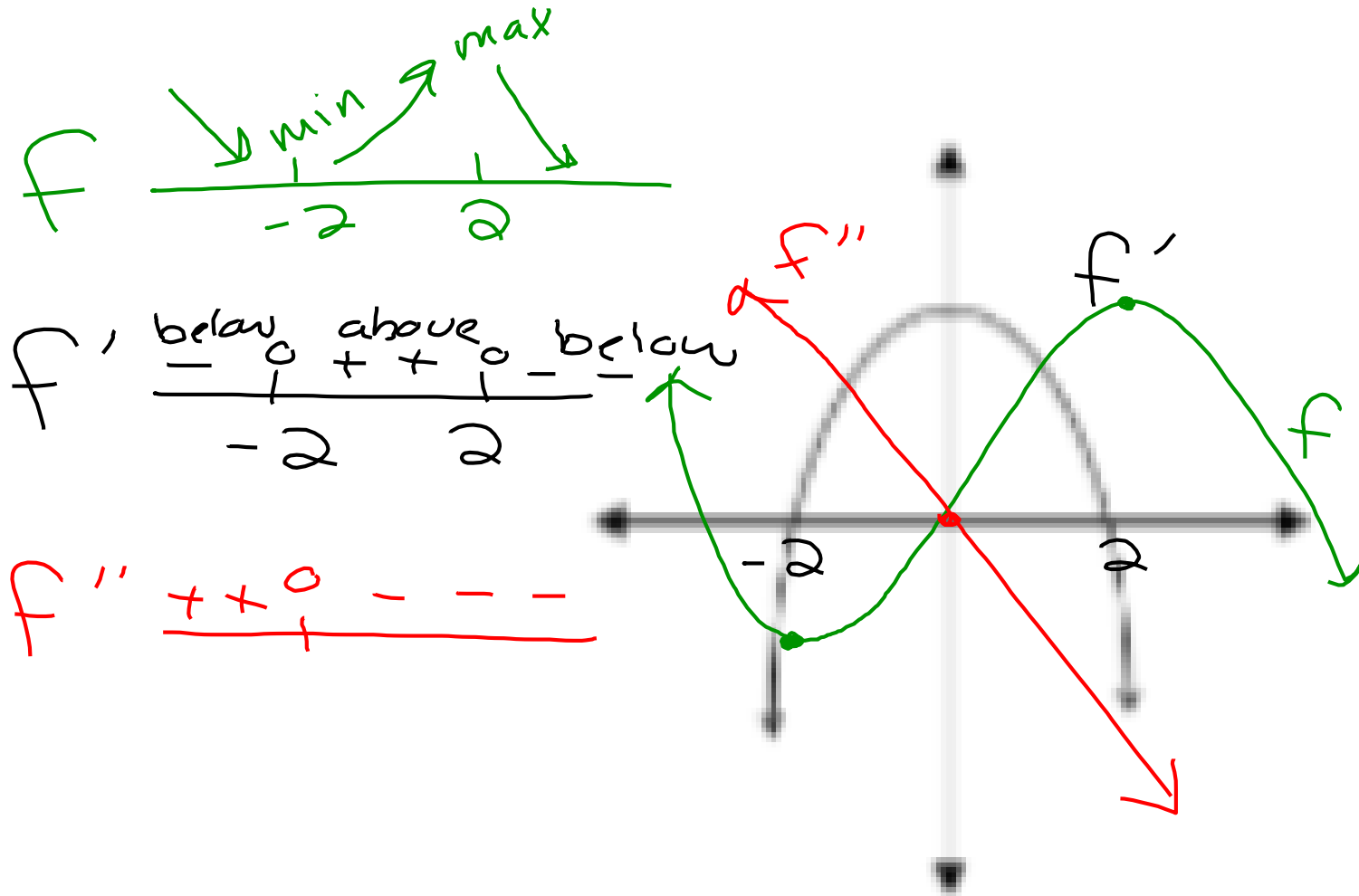
$F''(x)$	<hr/> +	<hr/> -
$F(x)$	Concave up	concave down



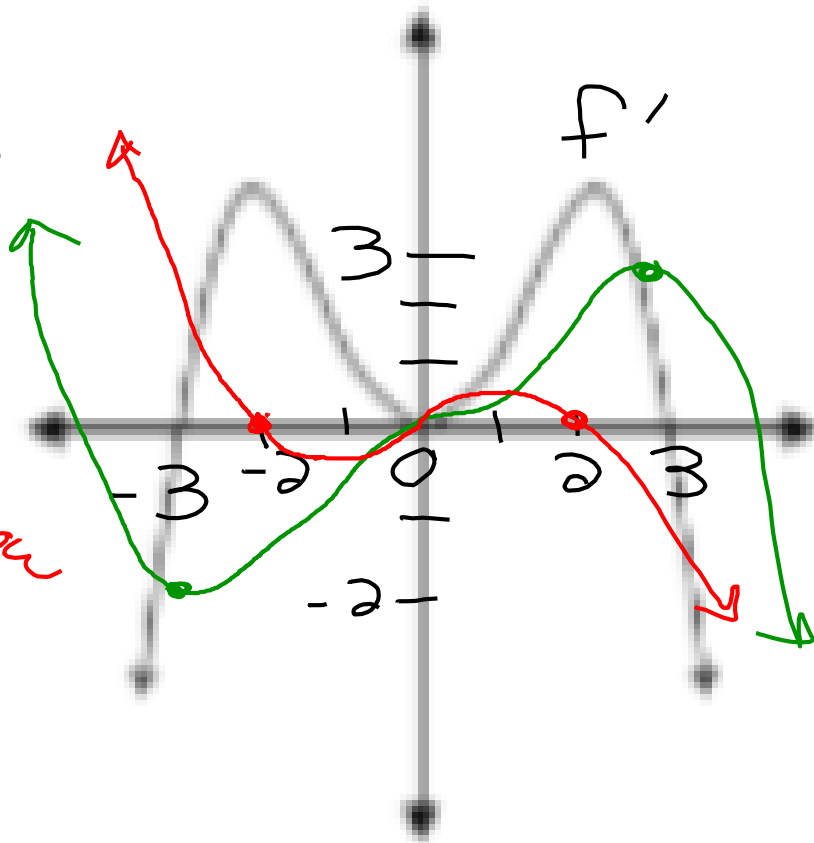
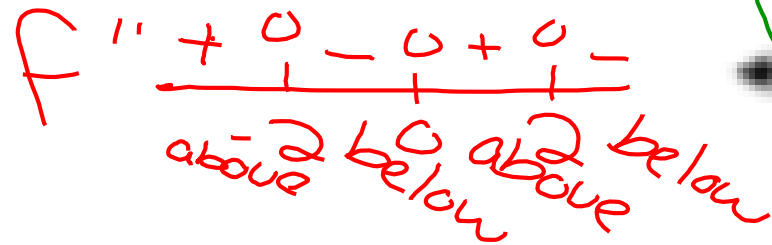
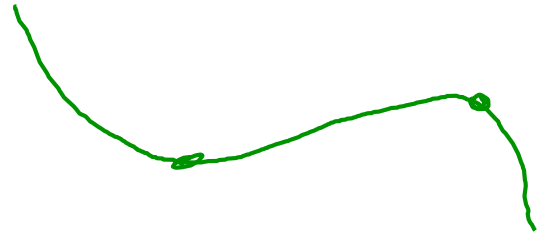
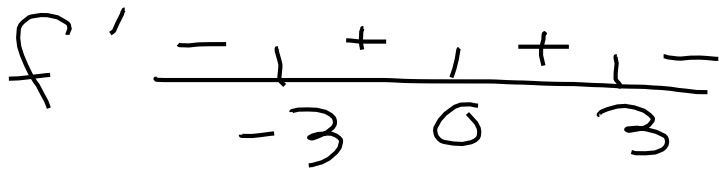
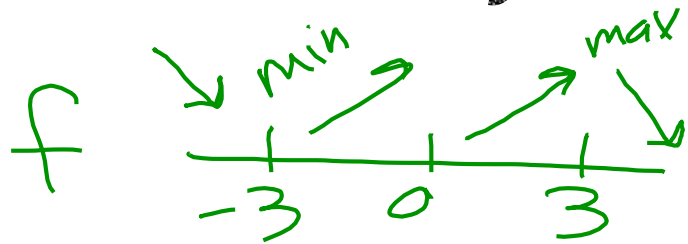
1. FROM f' SKETCH f AND f''



2. FROM f' SKETCH f AND f''



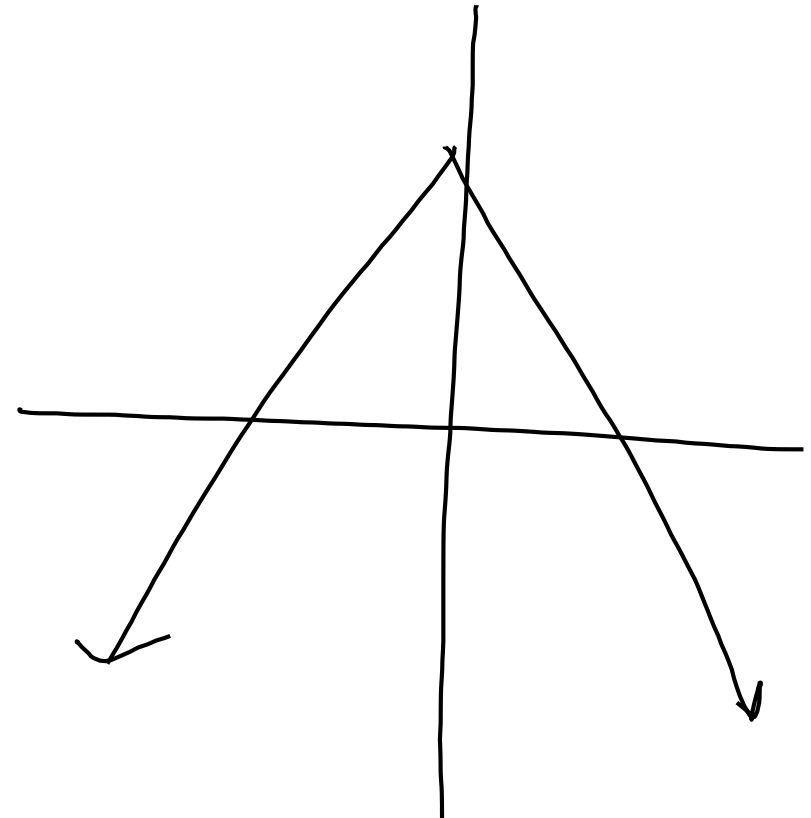
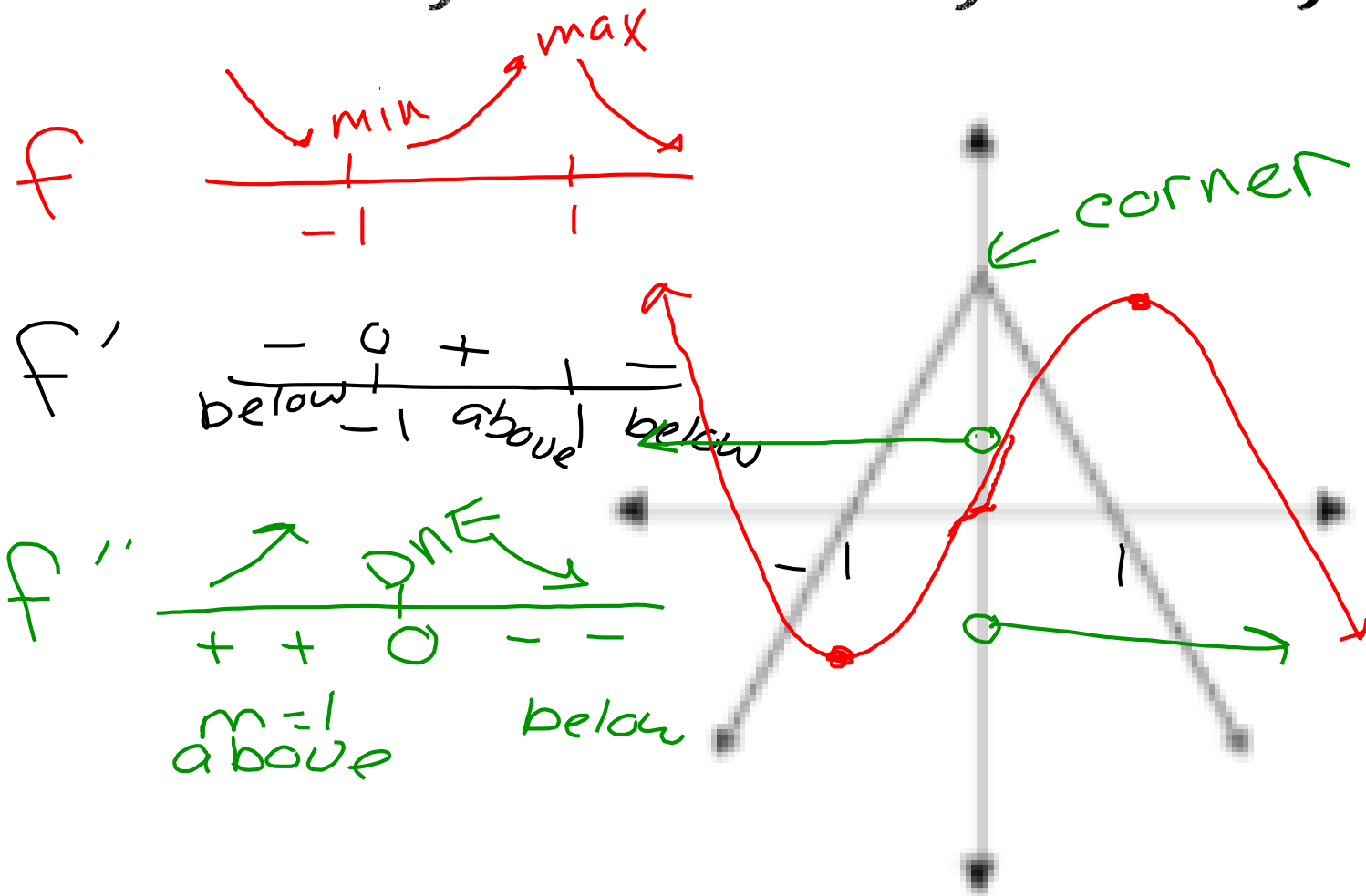
3. FROM f' SKETCH f AND f''



above
on
below



4. FROM f' SKETCH f AND f''



1. DRAW A POSSIBLE GRAPH OF $f(x)$ GIVEN THE INFORMATION BELOW.

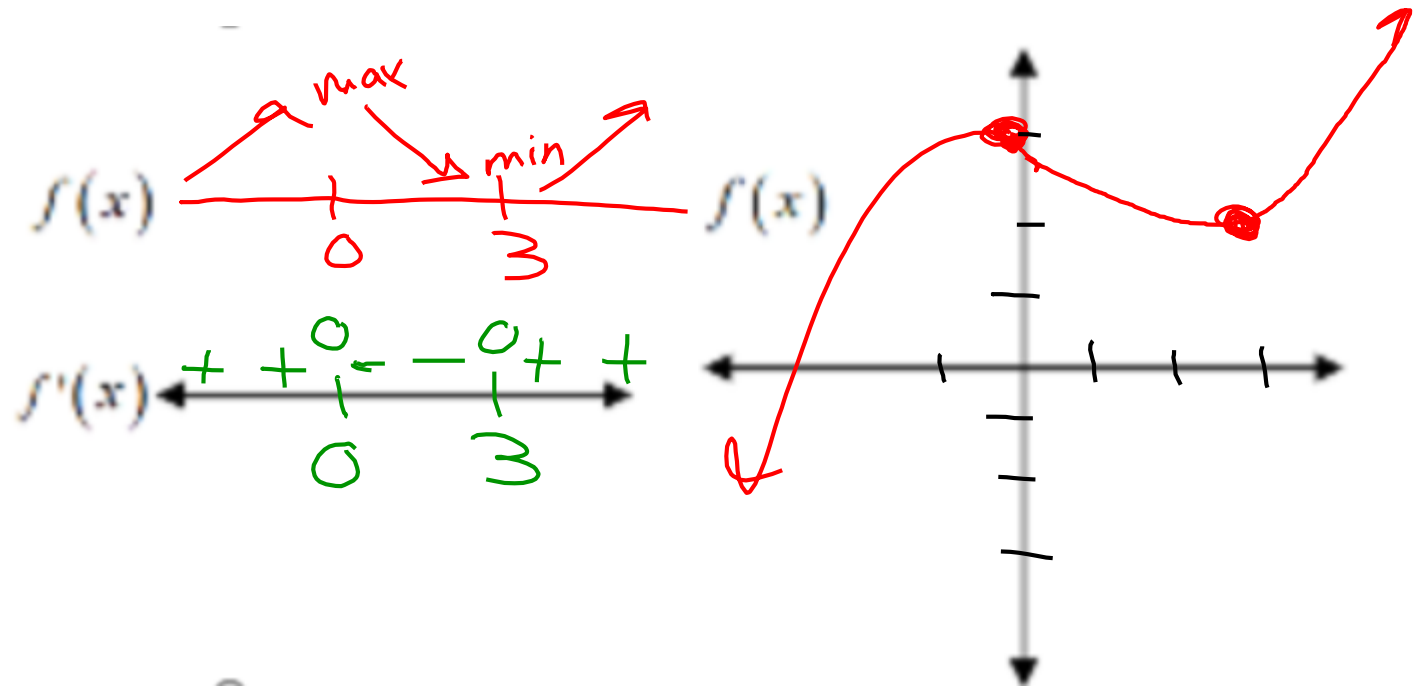
a. $f(x)$ is continuous

b. $f(3) = 2$ $(3, 2)$

pos. c. $f'(x) > 0, (-\infty, 0), (3, \infty)$

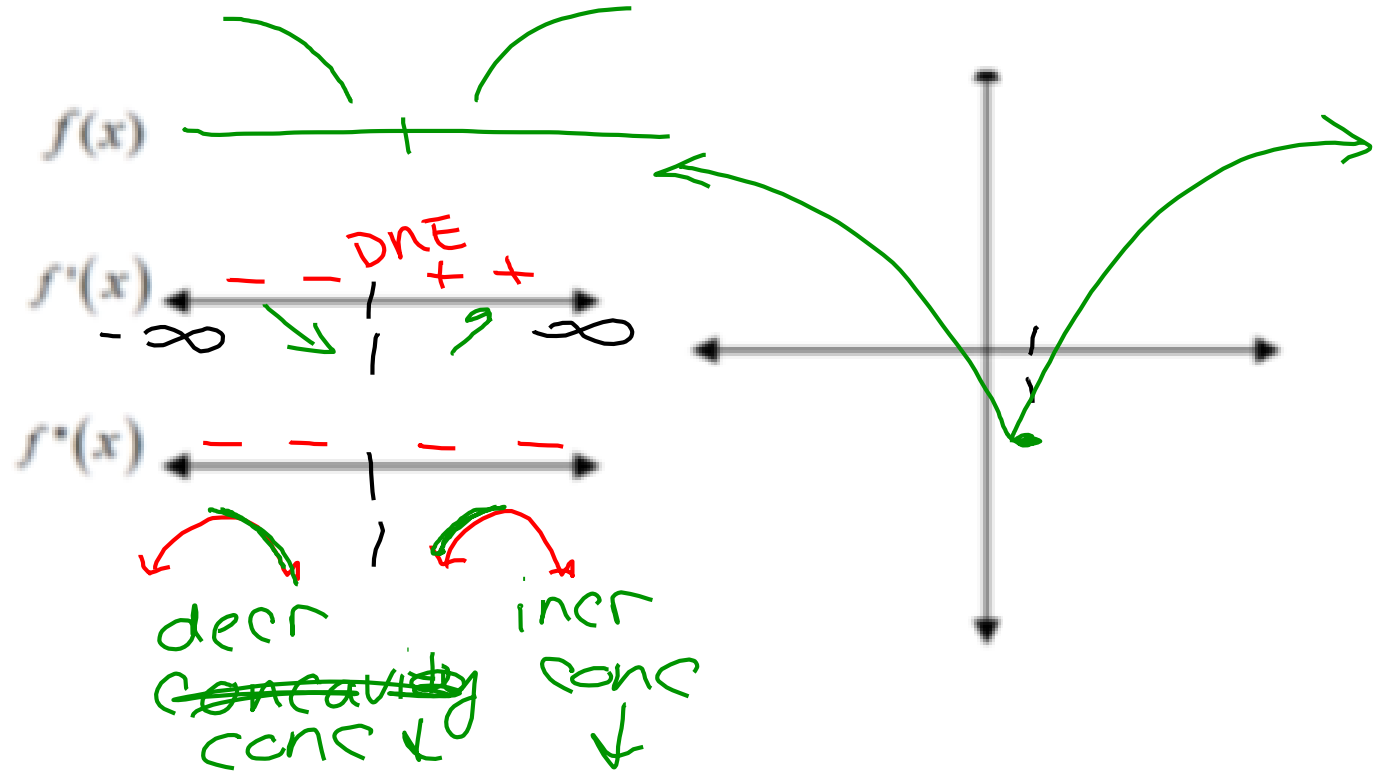
neg. d. $f'(x) < 0, (0, 3)$

e. $f'(x) = 0$ at $x = 0, x = 3$



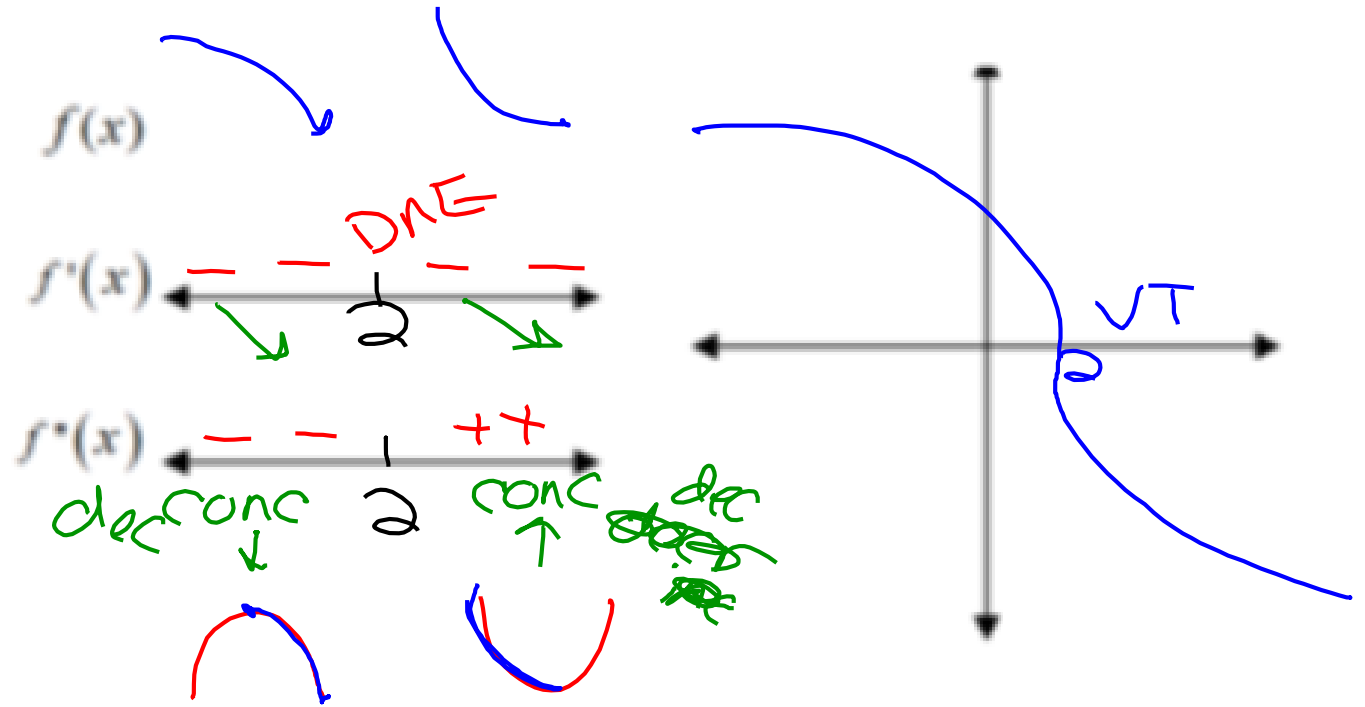
2. DRAW A POSSIBLE GRAPH OF $f(x)$ GIVEN THE INFORMATION BELOW.

- a. $f(x)$ is continuous
- neg* b. $f'(x) < 0$ $(-\infty, 1)$
- pos* c. $f'(x) > 0$ $(1, \infty)$
- d. $f'(x)$ is undefined at $x = 1$
- e. $f''(x) < 0$ at $(-\infty, 1) \cup (1, \infty)$
neg



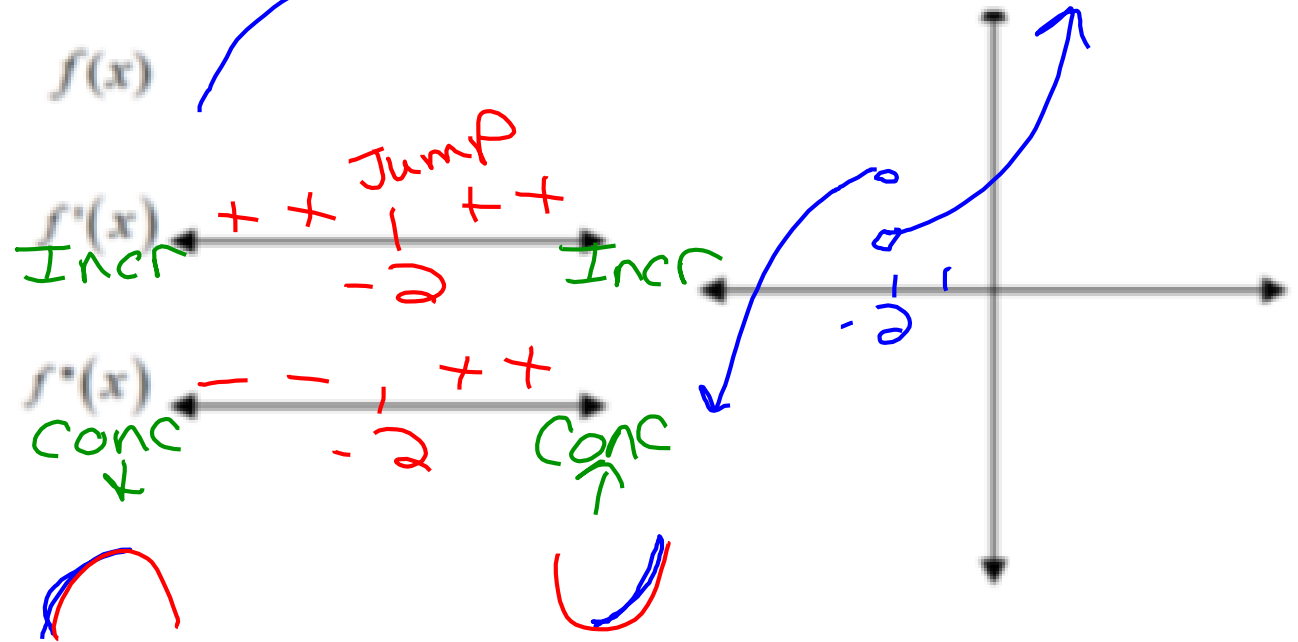
3. DRAW A POSSIBLE GRAPH OF $f(x)$ GIVEN THE INFORMATION BELOW.

- ✓ a. $f(x)$ is continuous
- ✓ b. $f'(x) < 0, (-\infty, 2), (2, \infty)$
- ✓ c. $f'(x)$ is undefined at $x = 2$
- neg d. $f''(x) < 0$, when $x < 2$
- pos e. $f''(x) > 0$ at $x = 0, x > 2$



4. DRAW A POSSIBLE GRAPH OF $f(x)$ GIVEN THE INFORMATION BELOW.

- a. $f(x)$ has a jump at $x = -2$
- b. $f'(x) > 0; (-\infty, -2), (-2, \infty)$
- c. $f''(x) < 0; (-\infty, -2)$
- d. $f''(x) > 0; (-2, \infty)$



5. DRAW A POSSIBLE GRAPH OF $f(x)$ GIVEN THE INFORMATION BELOW.

- a. $f(x)$ is continuous $[-4, 3]$
- b. $f'(x) < 0$ on $(-4, -2)$
- c. $f'(x) > 0$ on $(-2, 1) \cup (1, 3)$
- d. $f'(x) = \text{undef.}$ at $x = -2$
- e. $f(-2) = -3$ $f(1) = 3$ $(-2, -3)$ $(1, 3)$
- f. $f'(x) = 0$ at $x = 1$
- g. $f''(x) < 0$; $(-4, -2) \cup (-2, 1)$
- h. $f''(x) > 0$; $(1, 3)$

