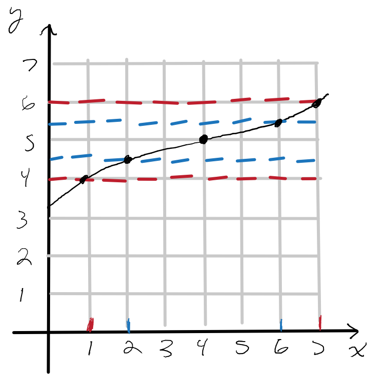
Section 2.7

2.



$|f(x) - 5| < 1$ $\quad$ $|f(x) - 5| < 0.5$

If $1 < x < 7$, then $|f(x) - 5| < 1$.

So $\quad 1 < x < 7$

$1 - 4 < x - 4 < 7 - 4$

$-3 < x - 4 < 3$

$0 < |x - 4| < 3$, Hence $\boxed{\delta = 3}$

If $2 < x < 6$, then $|f(x) - 5| < 0.5$.

So $\quad 2 < x < 6$

$2 - 4 < x - 4 < 6 - 4$

$-2 < x - 4 < 2$

$0 < |x - 4| < 2$, Hence $\boxed{\delta = 2}$

4. RECALL THE DEFINITION OF $\lim_{x \to a} f(x) = L$:

FOR EVERY $\varepsilon > 0$, THERE EXISTS A $\delta > 0$ SO THAT IF $0 < |x - a| < \delta$, THEN $|f(x) - L| < \varepsilon$.

LET $\varepsilon > 0$ AND CHOOSE $\delta = \varepsilon$ (THIS CHOICE WILL BECOME APPARENT LATER). SUPPOSE $0 < |x - a| = |x - 3| < \delta$. THEN

$$
\begin{aligned}
|f(x) - L| &= \left| \frac{x^2 - 7x + 12}{x - 3} - (-1) \right| \\
&= \left| \frac{\cancel{(x-3)}(x-4)}{\cancel{x-3}} + 1 \right| \\
&= |x - 4 + 1| \\
&= |x - 3| < \delta = \varepsilon.
\end{aligned}
$$

WE CAN CANCEL BECAUSE WE ASSUMED $|x-3| > 0$, SO $x - 3 \neq 0$ AND NOT DIVIDING BY ZERO

THEREFORE THE LIMIT IS -1.

Section 3.1

1. SUPPOSE $P = (r, s)$

a. $$m = \lim_{x \to r} \frac{f(x) - s}{x - r}$$

b. USING P, m AS ABOVE, WE CAN USE POINT-SLOPE FORM

$$(y - s) = m(x - r)$$

a. $$m = \lim_{x \to 1} \frac{(-3x^2-5x+1)-(-7)}{x-1}$$

$$= \lim_{x \to 1} \frac{-3x^2-5+8}{x-1}$$

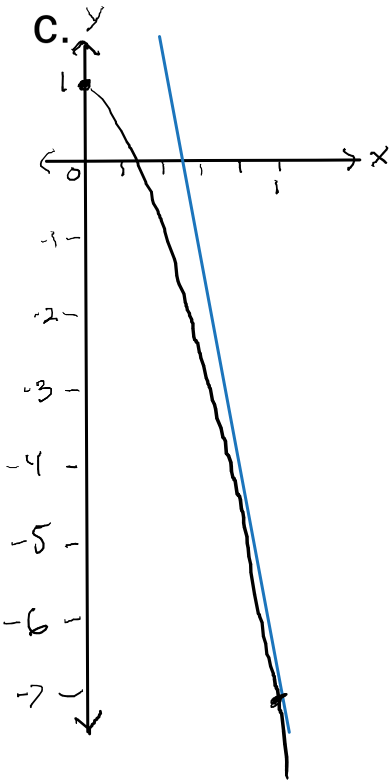
$$= \lim_{x \to 1} \frac{-(3x+8)\cancel{(x-1)}}{\cancel{(x-1)}}$$

$$= \lim_{x \to 1} -3x-8 = -11$$

b. $y+7=-11(x-1)$

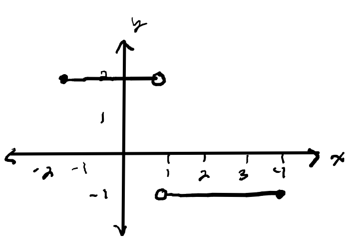
$y=-11x+4$ TANGENT LINE

c.

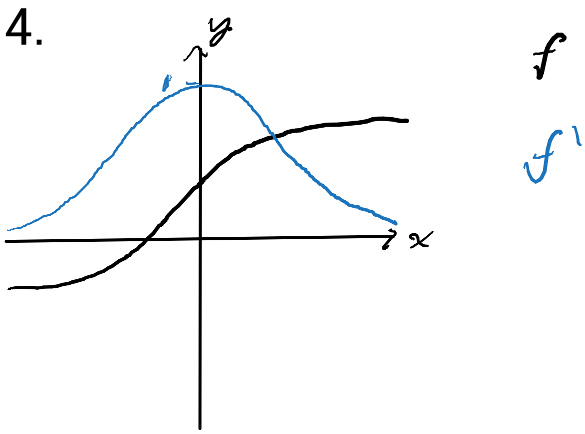


Y-SCALE ≠ X-SCALE

3.



4.



6.