

Say you are given a problem where you need to determine when $f'(t) < 0$ given $f'(t) = t^2 + 2t - 3$ then the easiest way to do this problem is by a numberline. First find the zeros of $f'(t)$, i.e.

$$\begin{aligned} f'(t) &= (t+3)(t-2) = 0 \\ \Rightarrow t+3 &= 0 \quad t-2 = 0 \\ \Rightarrow t &= -3 \quad t = 2 \end{aligned}$$

Now plot a number line like so



Now, that you have a number line, determine the sign $f'(t)$ in each interval. To do this evaluate $f'(t)$ at some point in each interval, i.e

$$\begin{aligned} f'(-2) &= (-4+3)(-4-2) = 6 \\ f'(0) &= (0+3)(0-2) = -6 \\ f'(3) &= (3+3)(3-2) = 6. \end{aligned}$$

Now, plot the number line with the positive and negatives in it



From this we see that $f'(t) < 0$ in the interval $t \in (-3, 2)$ and $f'(t) > 0$ in the intervals $t \in (-\infty, -3) \cup (2, \infty)$.