Answer on Question #85486 – Math – Calculus

Question

Trace the curve

$$22y = (x + 1)(x - 1) \qquad\qquad (1)$$

By showing all the properties you use to trace it.

Solution

1. Domain:

$x \in (-\infty; +\infty)$.

2. Symmetrical:

$$22y = (x + 1)(x - 1) \Leftrightarrow y = \frac{(x+1)(x-1)}{22} = f(x) , \qquad\qquad (2)$$

then $f(-x) = \frac{(-x+1)(-x-1)}{22} = \frac{(x-1)(x+1)}{22} = f(x)$ – the function is even and symmetric with respect to the Oy axis.
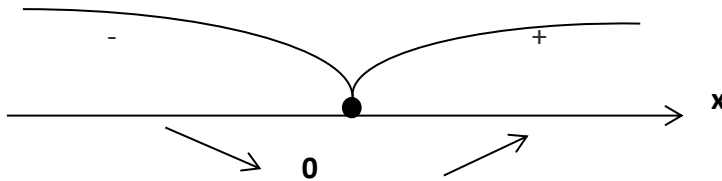
3. Not periodic.
4. Points of intersection with axes of coordinates:

Ox: $f(x) = 0 \Rightarrow x = -1$ and $x = 1 \Rightarrow$ (-1; 0) and (1; 0) –wanted points;

Oy: $x = 0 \Rightarrow f(0) = \frac{(0+1)(0-1)}{22} = -\frac{1}{22} \Rightarrow (0; -\frac{1}{22})$.

5. Extremes and monotony intervals:

$$f(x)^{/} = (\frac{(x+1)(x-1)}{22})^{/} = \frac{x}{11}, f(x)^{/} = 0 \Rightarrow \frac{x}{11} = 0 \Rightarrow x = 0.$$

$x \in (-\infty; 0)$ - the function is monotonously decreases;

$x \in (0; \infty)$ - the function is monotonously increasing;

$(0; -\frac{1}{22})$- the point of maximum.

6. Points of overhang and concavity:

$f(x)^{//} = 0 \Rightarrow \frac{1}{11} = 0$- there is no equation of deviations

7. Asymptotes:
   a) horizontal asymptotes is not so $\lim\limits_{x \to \pm\infty} f(x) = \lim\limits_{x \to \pm\infty} \frac{(x+1)(x-1)}{22} = \pm\infty$;
   b) vertical asymptotes is not so $f(x) = \frac{(x+1)(x-1)}{22}$ is continuous;

c) inclined asymptotes is not so $\lim\limits_{x \to \pm\infty} \frac{f(x)}{x} = \pm\infty$.

8. We build the function (1) graph (use research 1-7):