

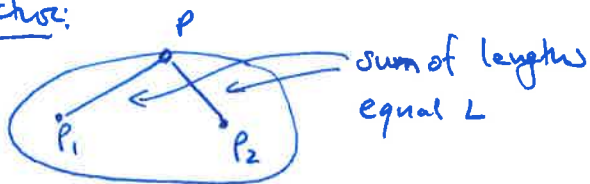
Worksheet 7

1) Let $f(x) = \frac{x^2 - 1}{x^3 - 4x}$

- What are the zeros of $f(x)$
- What are the vertical asymptotes of $f(x)$
- What is the behaviour of $f(x)$ near $\pm \infty$
- Sketch $f(x)$

2) Alternative definition of an ellipse: Given two points P_1 and P_2 and a length L ($L > P_1P_2$), then the set of points P such that $L = PP_1 + PP_2$ forms an ellipse.

Picture:



Given $P_1 = (-d, 0)$, $P_2 = (0, d)$ and $L > 2d$, where L and d are numbers, find the equation of the ellipse.

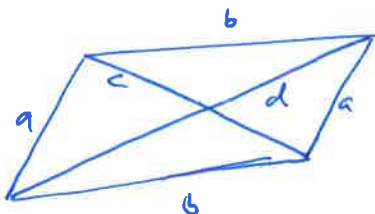
3) Let the triangle ABC be given, where $A: (-1, 2)$, $B: (3, 4)$ and $C: (1, 6)$. Let M_1, M_2, M_3 be the midpoints of the line segments BC, AC, AB respectively

- Plot ABC
- Find coordinates of M_1, M_2, M_3
- Show that the lines AM_1, BM_2 and CM_3 intersect in one point
- Was (c) a coincidence?

- 4) Let P be a parallelogram with side lengths a and b and diagonals c and d . Use Pythagoras's Theorem to show

$$2(a^2 + b^2) = c^2 + d^2$$

Picture:



- 5) (Bonus question, worth 1P) You are in a room with a square box of side length a and a ladder of length L . The square box is resting against the wall and you place the ladder against the box. How far up the wall can you reach? Express your answer in L and a .

Picture:

