Algebra Sheet 1

Non-Calculator

Questions

Q1.

(a) Simplify $f(x, y) = x(x + y + 2) + 2 - x$

(b) Work out $f(x, 2)$

(c) For which x does $f(x, 2) = 0$ by completing the square.

(d) Plot $y = f(x, 2)$

Q2.

(a) Plot the two line graphs $y = 4x + 2$ and $y = -2x + 5$

(b) Make sure the graph indicates where the lines cross the x and y axis

(c) Using your graph approximate where the lines intersect

(d) Calculate exactly where the lines intersect.

(e) calculate the midpoint of the line from the origin to the intersection point

Q3. Solve the simultaneous equations $m + n = 5$ and $4m + 5n = 23$

Q4. Solve $\frac{1}{x+3} - \frac{1}{x+1} = 2$

Q5.

The following table depicts the number of visitors to my website in it's first five days of going up.

Day	1	2	3	4	5
Visitors	8	11	14	17	20

(a) Work out the nth term of this sequence

(b) Work out the number of viewers on the $10th$ day

(c) Work out the number of days for the number of viewers to go above 100.

Q6.

Let $f = x^3 - 5x + 3$,

(a) Show without explicitly calculating it that f has a root between 0 and 1

(b) Let $x^3 - 5x + 3 = 0$ then show that $x = \frac{x^3+3}{5}$

(c) Starting with $x_0 = 0$ use the iterative formula twice $x_{n+1} = \frac{x_n^3+3}{5}$ to find an approximation for the root.

Once again the first two parts of the challenge are essential and the next two parts are challenging and beyond the scope of GCSE.

Challenge

1. Plot $y = \frac{3}{x}$
2. Plot $y = sin(2x)$
3. Find the roots of $y = sin(x) + \frac{3}{x}$
4. Try to plot $y = sin(x) + \frac{3}{x}$
5. Check in Desmos: https://www.desmos.com/calculator