

PART 1 (Multiple choice)

1. C
2. B
3. E
4. E
5. A
6. C
7. C
8. A
9. B
10. A
11. B
12. E (AB only.)
13. A.
14. D
15. A
16. A
17. C
18. E
19. D
20. A

21. C

22. C

23.

24. C

25. C

26. B

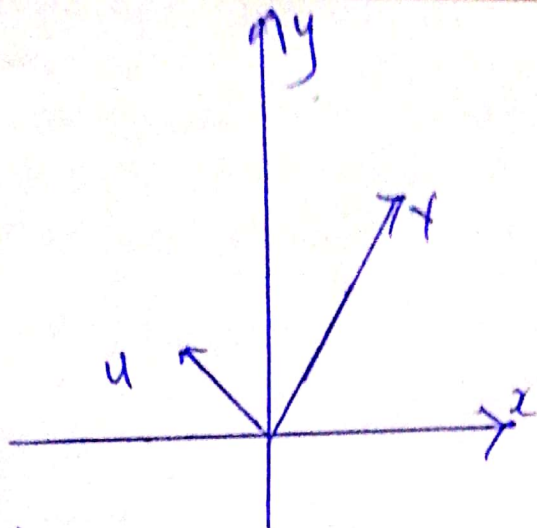
27. A

28. B

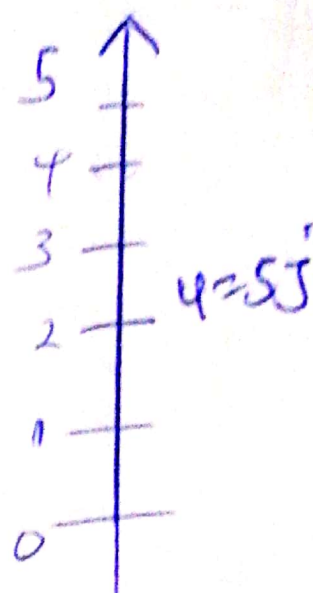
29. C

30. C

(1)



$$= \langle 0, 5 \rangle$$



$$u + 2v$$

Let's assume

$$u = \langle -2, 1 \rangle$$

$$v = \langle 1, 2 \rangle$$

Then vector $u + 2v$ is

$$u + 2v = \langle -2 + 2, 1 + 4 \rangle$$

Part 2.

2. Solve the system.

$$x = y + 3$$

$$x = y^2 + 1$$

Soln. Since $x = x$.

$$y + 3 = y^2 + 1$$

$$y^2 - y - 2 = 0$$

$$\Rightarrow y^2 - 2y + y - 2 = 0$$

$$(y^2 + y) - (2y - 2) = 0$$

$$y(y + 1) - 2(y - 1)$$

$$(y - 2)(y + 1) = 0$$

$$y = \underline{\underline{2}} \text{ or } y = \underline{\underline{-1}}$$

$$(3) \begin{vmatrix} 2 & -2 & 3 & 3 \\ 1 & 1 & -2 & 4 \\ -1 & 2 & 0 & 0 \\ 3 & 5 & 2 & 4 \end{vmatrix} = (-1)^{5+1} \times (-1) \times \begin{vmatrix} 2 & -2 & 3 & 3 \\ 1 & 1 & -2 & 4 \\ 1 & 2 & 0 & 0 \\ 3 & 5 & 2 & 4 \end{vmatrix}$$

$$+ (-1)^{5+2} \times 2 \times \begin{vmatrix} 2 & -2 & 3 & 3 \\ 1 & 1 & -2 & 4 \\ 1 & 1 & 0 & 0 \\ 3 & 5 & 2 & 4 \end{vmatrix}$$

$$\Rightarrow 2 \times \begin{vmatrix} -2 & 4 \\ 2 & 4 \end{vmatrix} + 3 \times \begin{vmatrix} 1 & 4 \\ 5 & 4 \end{vmatrix} + (-3) \times \begin{vmatrix} 1 & -2 \\ 5 & 2 \end{vmatrix} + -4 \times \begin{vmatrix} -2 & 4 \\ 2 & 4 \end{vmatrix} + 6 \times \begin{vmatrix} 1 & 4 \\ 3 & 4 \end{vmatrix} + -6 \times \begin{vmatrix} 1 & -2 \\ 3 & 2 \end{vmatrix} = \underline{\underline{-148}}$$

(4.) Partial fraction decomposition.

$$\frac{4x^2+2x-1}{x^2(x+1)} \Rightarrow \frac{4x^2+2x-1}{x^2(x+1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+1}$$

$$\text{Set: } \frac{4x^2+2x-1}{x^2(x+1)} = \frac{x^2C + x(x+1)A + (x+1)B}{x^2(x+1)}$$

$$\Rightarrow 4x^2+2x-1 = x^2C + x(x+1)A + (x+1)B$$

Expand RHS

$$\Rightarrow 4x^2+2x-1 = x^2A + x^2C + xA + xB + B$$

$$(1) \Rightarrow 4x^2 + 2x - 1 = x^2(A+C) + x(A+B) + B$$

$\Rightarrow$ Coefficients of like terms should be equal

$$\Rightarrow A+C=4$$

$$A+B=2$$

$$B = -1$$

$$\Rightarrow A-1=2$$

$$A=3$$

$$C=4-3=1$$

$$\Rightarrow A=3, B=-1, C=1$$

$$\Rightarrow \frac{4x^2 + 2x - 1}{x^2(x+1)} = \frac{3}{x} + \frac{-1}{x^2} + \frac{1}{x+1}$$

(5) Geometric sequence.

$$a = 3$$

$$8^{\text{th}} = 384$$

$$ar^{(n-1)}$$

$$a_8 = (3)r^{(8-1)} = 384$$

$$\frac{3r^7}{3} = \frac{384}{3}$$

$$r^7 = 128$$

$$\log r = \log 128$$

$$r^7 = 2^7$$

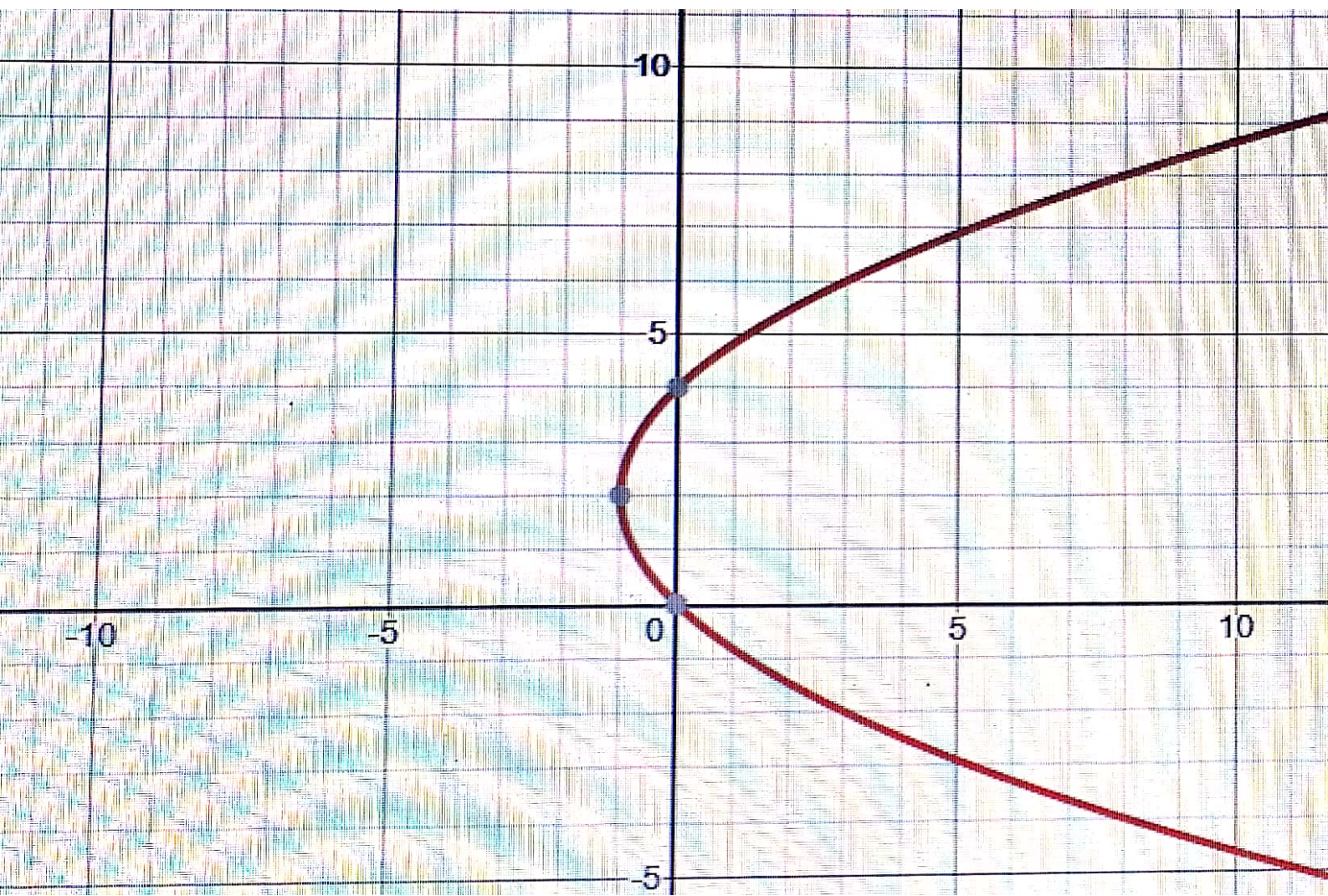
$$r = 2$$

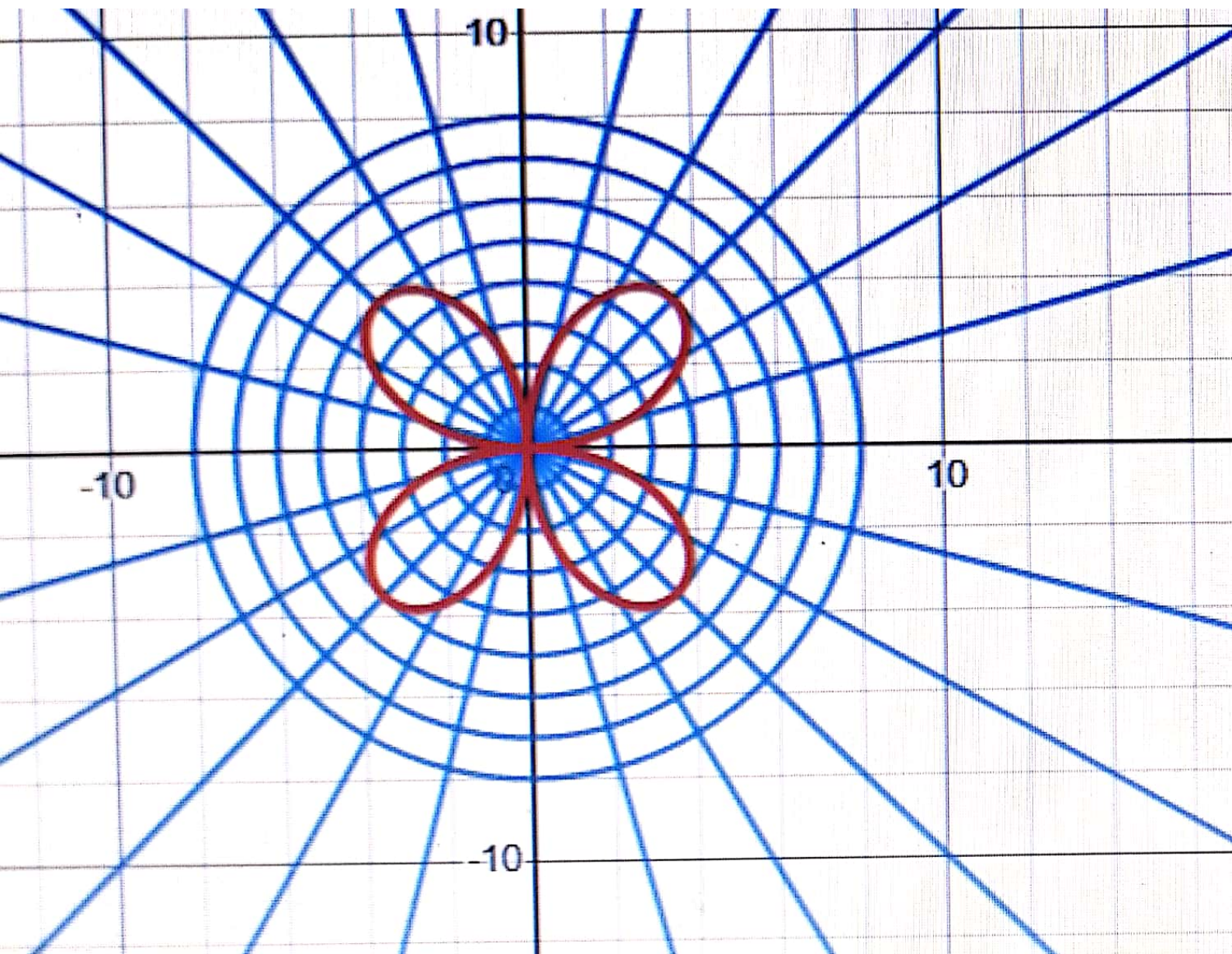
$$\text{Sum of sequence} = \sum_{k=0}^{n-1} (ar^k)$$

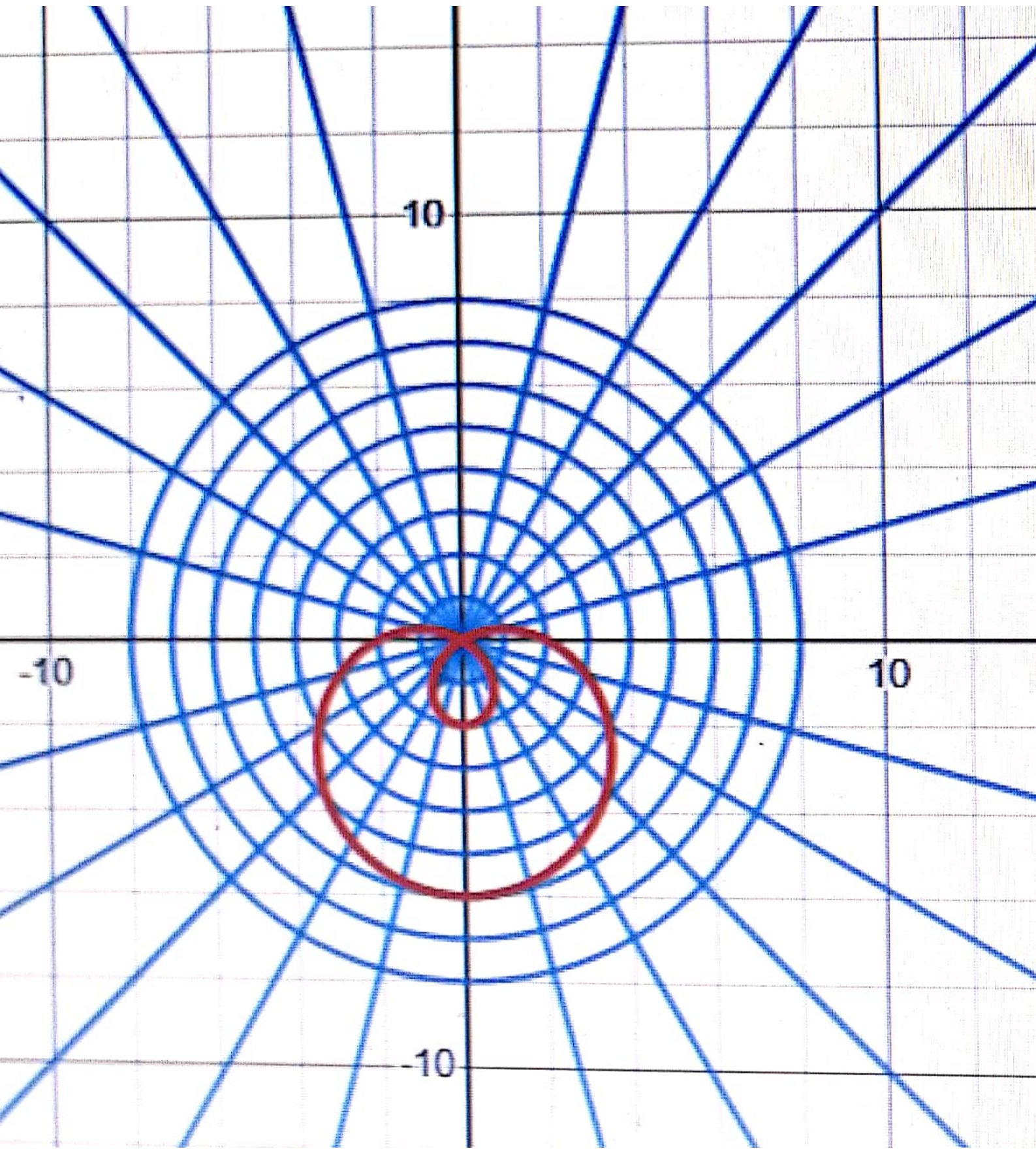
$$\Rightarrow \sum_{k=0}^7 (3(2)^k)$$

$$a_0 = 3 \times 2^7 = 384 \Rightarrow 3072$$

$$384 + \sum_{k=1}^7 3 \cdot 2^k$$







9. Derivative of a function.

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$g(x) = 2x^2 + 4x - 1$$

$$\Rightarrow \frac{d}{dx} [2x^2 + 4x - 1]$$

$$= 2 \cdot \frac{d}{dx} (x^2) + 4 \cdot \frac{d}{dx} (x) + \frac{d}{dx} (-1)$$

$$\Rightarrow (2)(2x) + (4)(1) + 0$$

$$= 4x + 4$$

$$= \lim_{h \rightarrow 0} (4x + 4)$$

$$= (4)(0) + 4$$

$$= \underline{\underline{4}}$$