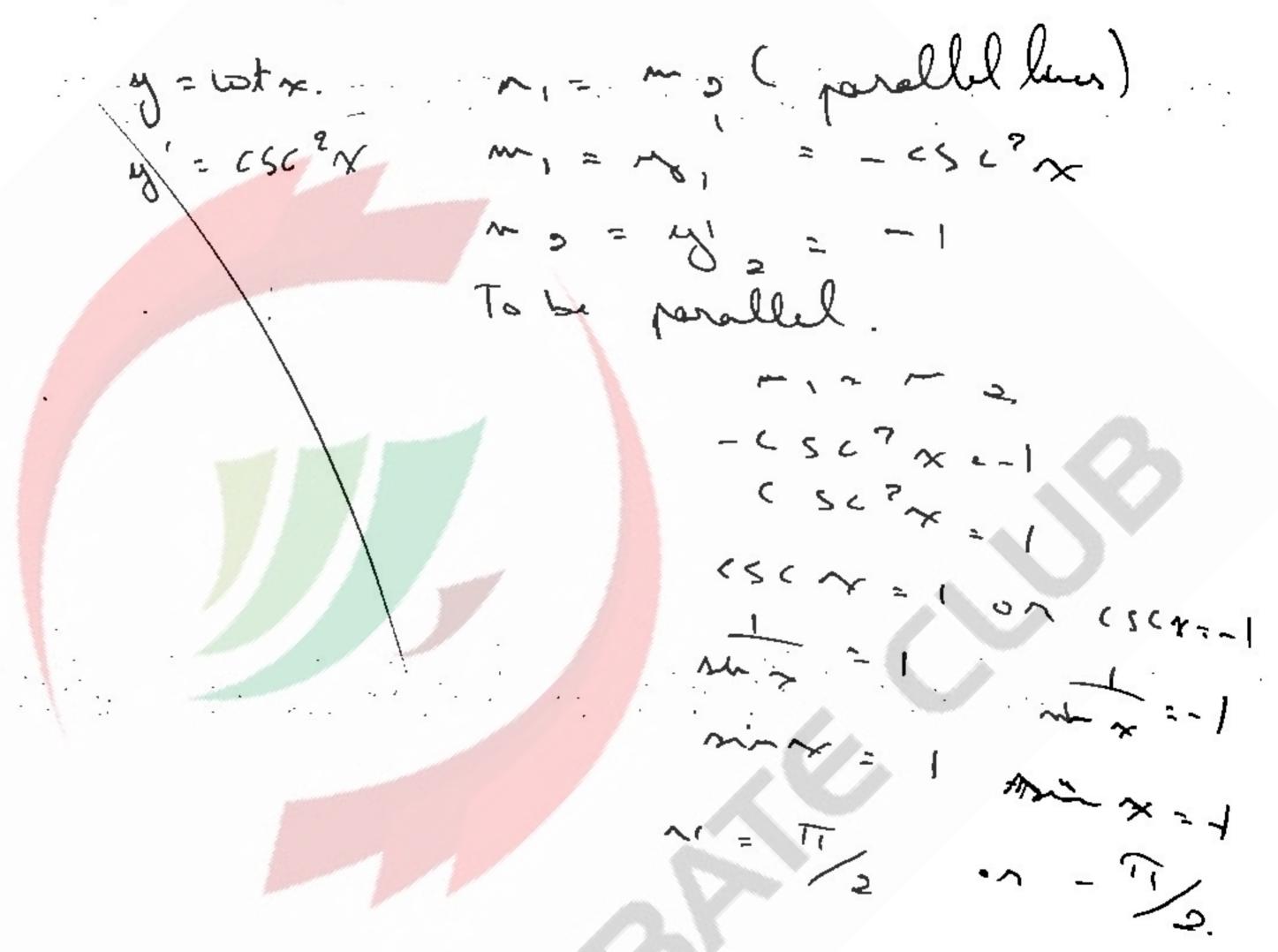
Please note that you have 7 questions and 7 pages

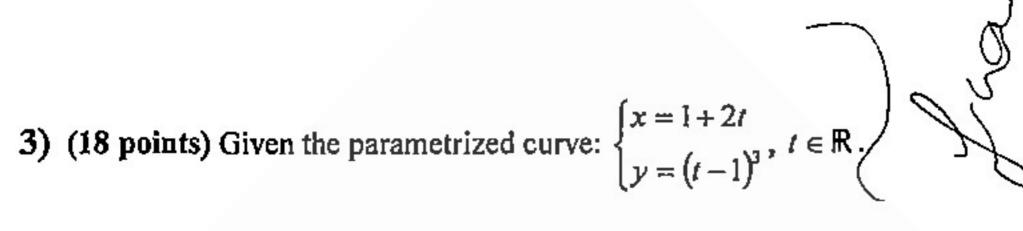
1) (10 points) Find all points on the curve $y = \cot x$, $0 < x < \pi$, where the tangent line is parallel to the line y = -x.



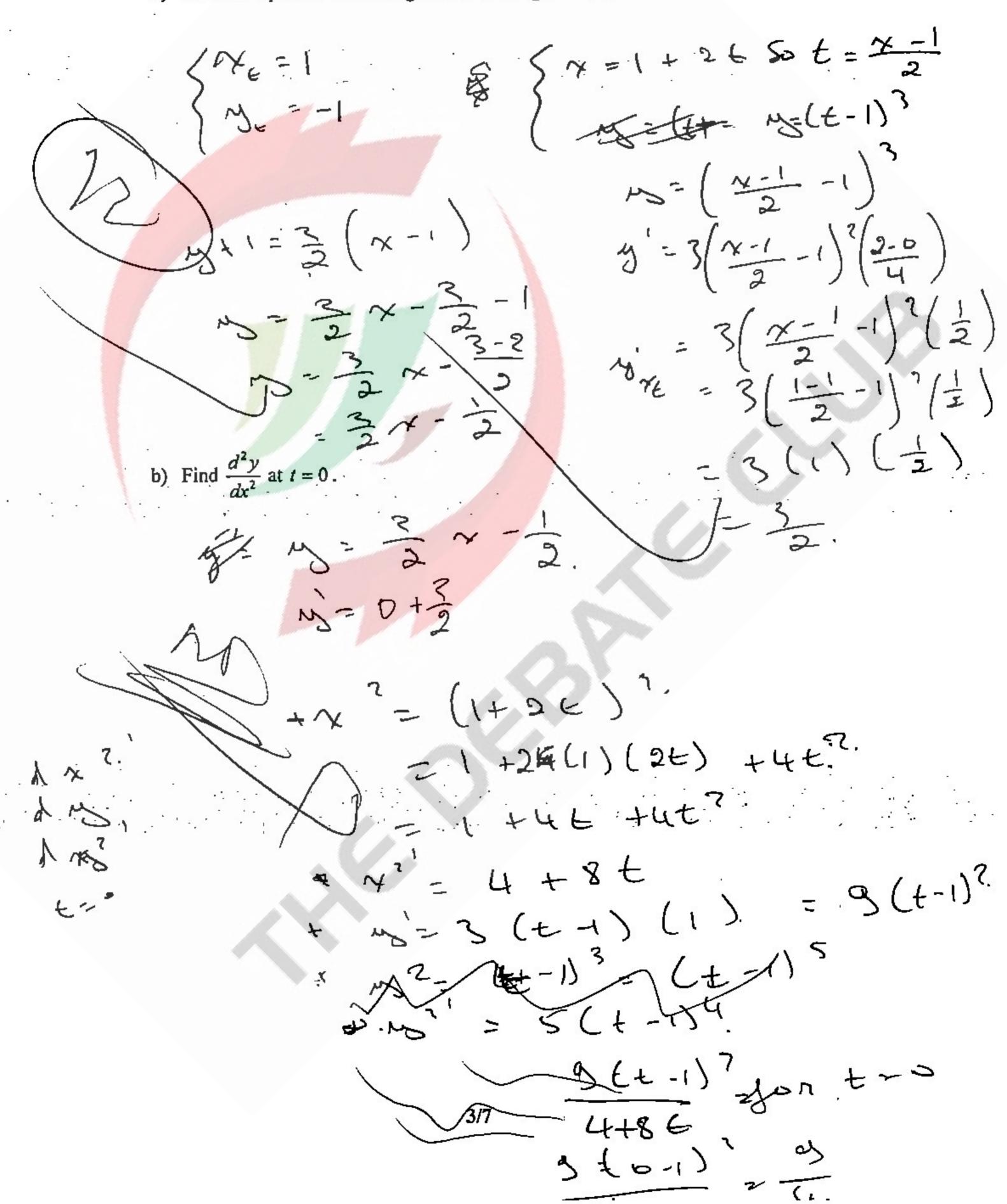
2) (12 points) Find the derivative of each of the following functions:

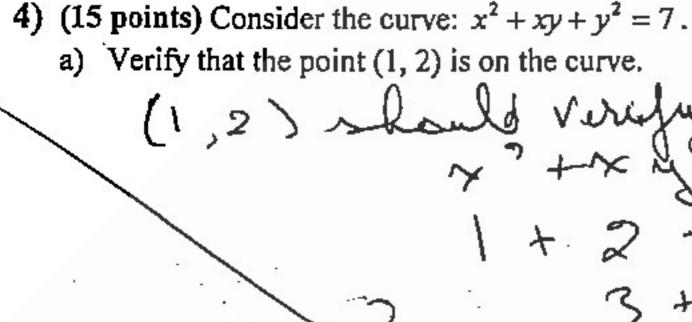
a)
$$y = \tan(2x^2 - 3x)$$

b)
$$y = \frac{\sin x}{1 + \cos x}$$
, $0 \le x \le \frac{\pi}{2}$

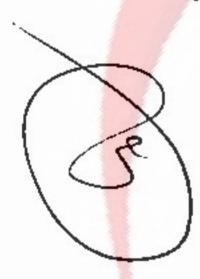


a) Find the equation of the tangent line to the given curve at t = 0.





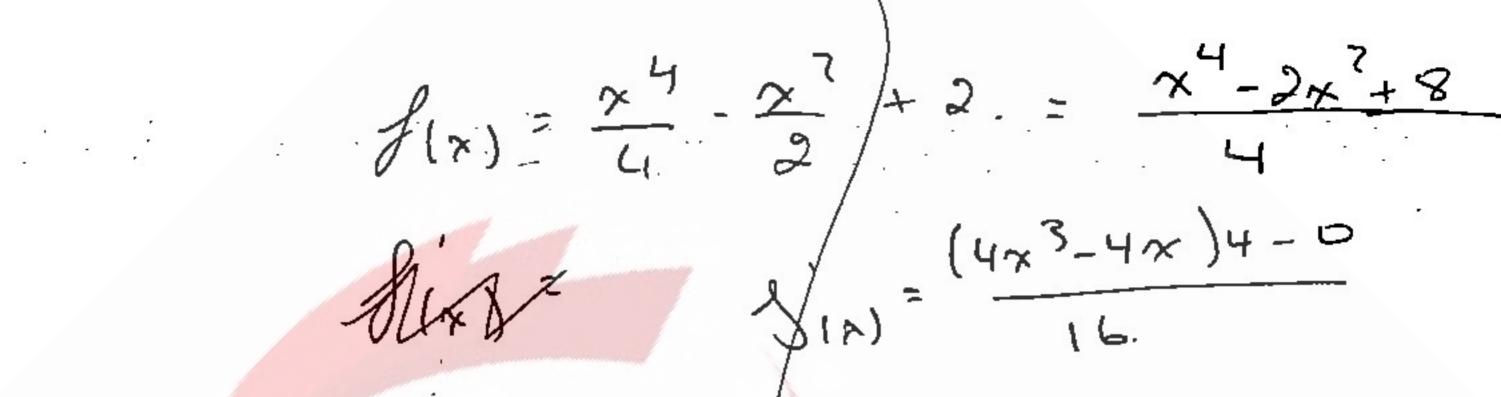
- (1,2) should variety the equation $x^2 + x + y + y^2 = 7$ 1 + 2 + 4 = 7 3 + 4 = 7 7 = 7
- b) Find the equation of the tangent line to the given curve at point (1, 2).



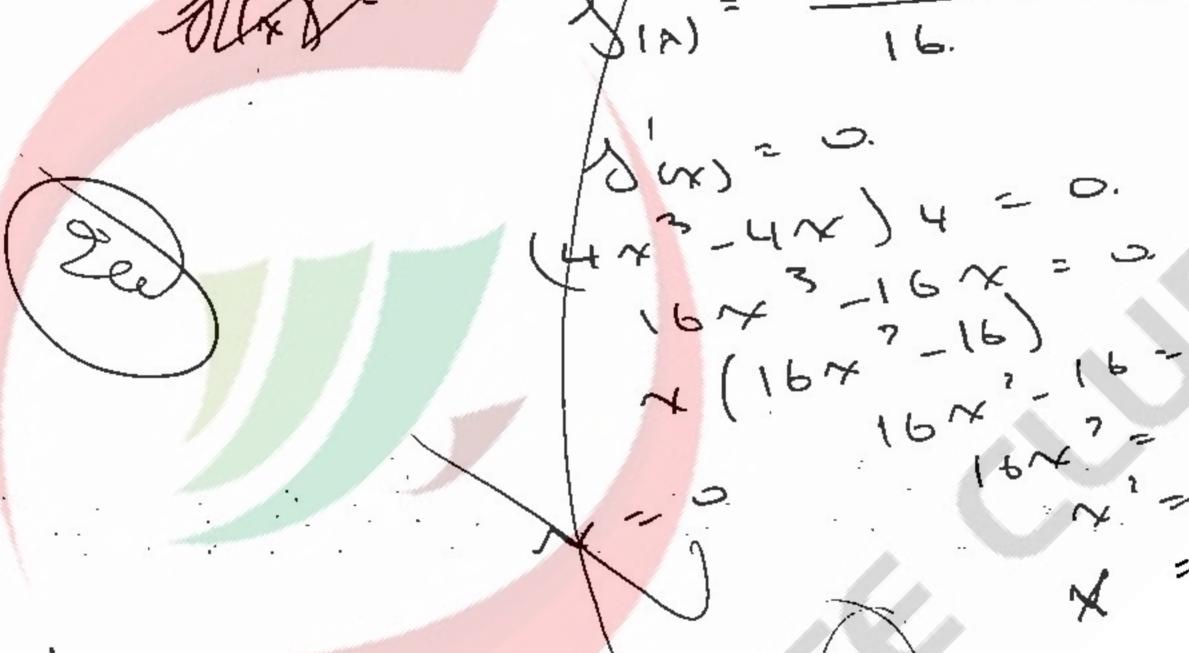
$$x^{7} + x + y + y^{2} = 7$$
. at (1,2)
 $2x + (1xy) + (1xx) + 2xy = 7$
 $2x + x + y + y = 7$
 $2x + x + y = 7$
 $3x^{2} = 7$
 3

the equation of the normal line to the curve at point (1, 2).

5) (20 points) Indicate and identify the kind of all extreme values (absolute and local) of the function: $y = f(x) = \frac{x^4}{4} - \frac{x^2}{2} + 2$, where $x \in [-2, 2]$.









6) (10 points) Is $y = x^3$ a solution to the differential equation $x^2y'' + xy' - 9y = 0$? Explain.

 $48^{1} = 3x^{2}$ $48^{1} = 6x$ $48^{2} (6x) + t_{2} x (3x^{2}) - 9(x^{3}) = 6x$ $6x^{3} + 3x^{3} - 9x^{3} = 0$ $3x^{2} - 9x^{2} = 0$ $5 = 2t_{1} t_{1} t_{2} t_{3}$ $5 = 2t_{1} t_{1} t_{2} t_{3}$

7) (15 points) A particle p(x,y) moves along the curve $y=x^{\frac{1}{2}}$ in the first quadrant in such a way that its distance from the origin $D = \sqrt{x^2 + y^2}$ increases at the rate of 11 cm per second. Find $\frac{dx}{dy}$ when x = 3 cm.