

**Mathematics in Economics**  
**Written Exam – Part 1 – 30 points**

Name: .....

1) Find the derivatives:

a)  $y = x^5 + 4x^3 - 5x + \sin x$

b)  $y = \frac{3x+5}{\ln x}$

c)  $y = \ln(x^3 + 2x + 1)$

6 points

2) Find the domain of the function of two variables:

$f(x, y) = \ln(x - y + 3)$

6 points

3) Find Taylor series of  $f(x) = 4x^3 + 2x^2 - 5x + 1$  at the point  $a = 2$ .

6 points

4) Find maxima/minima of the function:  $y = x^3 - 12x + 4$ .

6 points

5) Find the increment (find total differential) of the function  $f(x, y) = 3xy + 2x^2 - 3y^2$  for  $x = 1, y = 2, dx = 0.1$  and  $dy = 0.2$ .

6 points