NAME: ID:

MATH 317 Q1 WINTER 2017 QUIZ 2

Feb. 3, 2017, 25 minutes

- The quiz has 3 problems. Total 10 + 1 points.

QUESTION 1. (5 PTS) *Let* $y = Y(x)$ *be implicitly defined near the point* $(1, 2)$ *through the equation*

$$x^2 + 2\,x\,y - y^2 = 1. \tag{1}$$

Calculate $Y'(1)$ *and* $Y''(1)$.

QUESTION 2. (5 PTS) *Let* $U(x,y), V(x,y)$ *be defined implicitly through*

$$x\,u - y\,v = 0, \qquad y\,u + x\,v = 1. \tag{2}$$

Calculate its Jacobian matrix at $x = y = 1$.

QUESTION 3. (1 BONUS PT) *Use Lagrange multiplier theory to prove* $\left|\det\begin{pmatrix} a & b \\ c & d \end{pmatrix}\right| \leqslant (a^2+b^2)^{1/2}\,(c^2+d^2)^{1/2}$.