

1

$$W = u^3 y^3 + u^3 + y^3 + 1$$

$$W_u = 3u^2(y^3 + 1)$$

$$W_y = 3y^2(u^3 + 1)$$

$$W_{uuu} = 6u(u^3 + 1) = A$$

$$W_{uuy} = 9u^2y^2 = B$$

$$W_{yyy} = 6y(u^3 + 1) = C$$

$$W_u = 0 \rightarrow u = 0 \text{ or } y = -1$$

$W_y = 0 \rightarrow (0, 0)$ And $(-1, -1)$ are critical points.

$$(0, 0) : AC - B^2 = 0 \rightarrow \text{Can't Conclude}$$

$$(-1, -1) : AC - B^2 = -81 < 0 \rightarrow \text{Saddle}$$