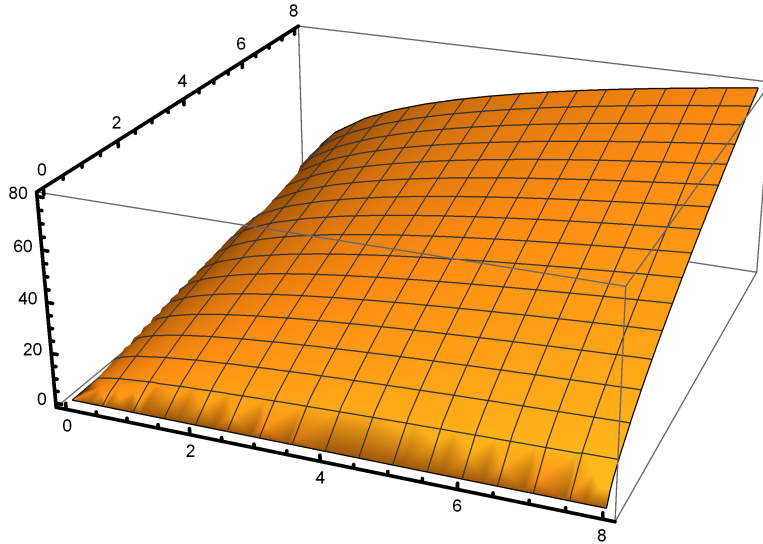


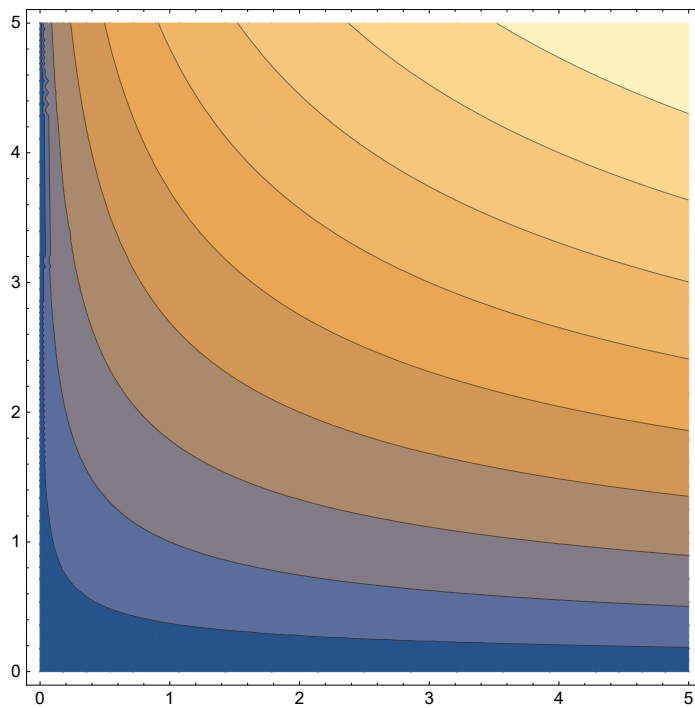
$$U = (10 * X^{0.3} * Y^{0.7})$$

$$10 X^{0.3} Y^{0.7}$$

Show[%77, Axes → True, Ticks → Automatic,
 AxesStyle → Directive[GrayLevel[0], AbsoluteThickness[1.89]]]



ContourPlot[U, {X, 0, 5}, {Y, 0, 5}]



$$J = \nabla_{\{X, Y\}} U$$

$$\left\{ \frac{3 \cdot Y^{0.7}}{X^{0.7}}, \frac{7 \cdot X^{0.3}}{Y^{0.3}} \right\}$$

$$H = \{ \{ \partial_{X, X} U, \partial_{X, Y} U \}, \{ \partial_{X, Y} U, \partial_{Y, Y} U \} \}$$

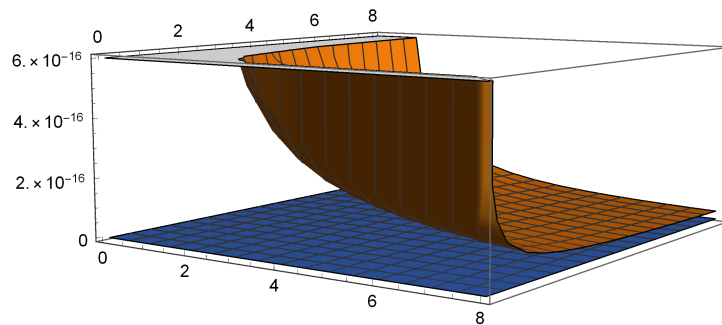
MatrixForm[H]

$$\begin{pmatrix} -\frac{2.1 Y^{0.7}}{X^{1.7}} & \frac{2.1}{X^{0.7} Y^{0.3}} \\ \frac{2.1}{X^{0.7} Y^{0.3}} & -\frac{2.1 X^{0.3}}{Y^{1.3}} \end{pmatrix}$$

$\Delta = \text{Det}[H]$

$$\frac{1.77636 \times 10^{-15}}{X^{1.4} Y^{0.6}}$$

Plot3D[$\{\Delta, Z = 0\}$, {X, 0, 8}, {Y, 0, 8}]



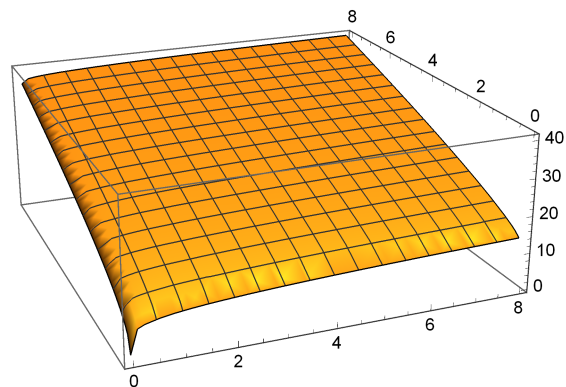
Is H negative semi definite? Is U quasi-concave?

- Change exponents of X and Y and do the exercise again.
- Try with

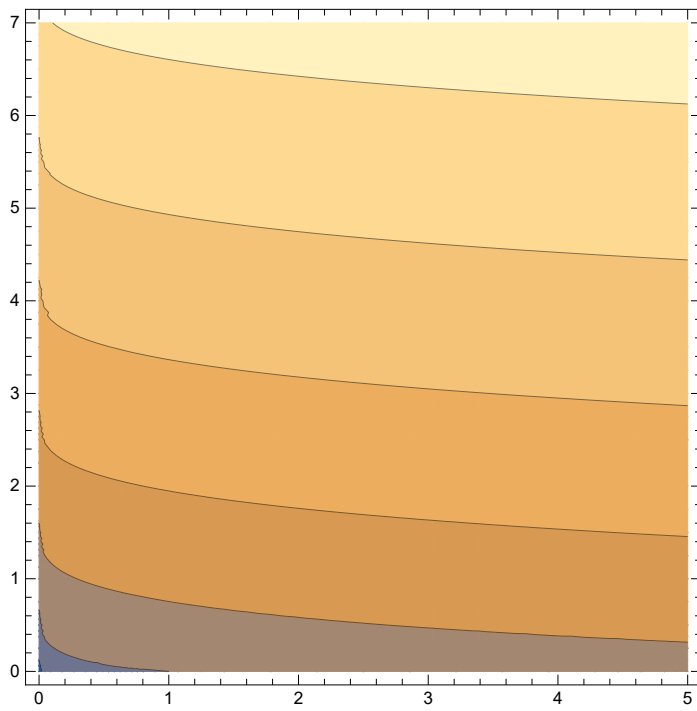
$$W = (10 * (X^{0.3} + Y^{0.7})^{0.5}) + 2 * Y$$

$$10 (X^{0.3} + Y^{0.7})^{0.5} + 2 Y$$

Plot3D[W, {X, 0, 8}, {Y, 0, 8}]



ContourPlot[W, {X, 0, 5}, {Y, 0, 7}]



J ? H ? Quasi - concavity of W ? Interpret.