

$${}^{x:y}\mathfrak{N} = x^n y^n (ax + by - c)$$

$$\max (ab)^n/c < 0 \min (ab)^n/c > 0$$

$${}_x\mathfrak{I} = x^{n-1} y^n ((n+1)ax + nby - nc) = 0: \quad {}_y\mathfrak{I} = x^n y^{n-1} (nax + (n+1)by - nc) = 0$$

$$(n+1)ax + nby - nc = 0 = nax + (n+1)by - nc \Rightarrow (n+1)ax + nby = 0 = nax + (n+1)by \Rightarrow ax = by$$

$$(2n+1)ax = nc = (2n+1)by \Rightarrow x = \frac{n}{2n+1} \frac{c}{a}: \quad y = \frac{n}{2n+1} \frac{c}{b}$$

$${}_{xx}\mathfrak{I} = n x^{n-2} y^n ((n+1)ax + (n-1)by - (n-1)c) \underset{\text{crit}}{=} n x^{n-2} y^n (2nax - (n-1)c) = n x^{n-2} y^n (c - ax)$$

$${}_{yy}\mathfrak{I} = n x^n y^{n-2} ((n-1)ax + (n+1)by - (n-1)c) \underset{\text{crit}}{=} n x^n y^{n-2} (2nax - (n-1)c) = n x^n y^{n-2} (c - ax)$$

$${}_{xy}\mathfrak{I} = n x^{n-1} y^{n-1} ((n+1)ax + (n+1)by - nc) \underset{\text{crit}}{=} n x^{n-1} y^{n-1} ((2n+2)ax - nc) = n x^{n-1} y^{n-1} ax = {}_{yx}\mathfrak{I}$$

$$\frac{{}_{xx}\mathfrak{I}}{{}_{yx}\mathfrak{I}} \Big| \frac{{}_{xy}\mathfrak{I}}{{}_{yy}\mathfrak{I}} = \frac{n x^{n-2} y^n (c - ax)}{n x^{n-1} y^{n-1} ax} \Big| \frac{n x^{n-1} y^{n-1} ax}{n x^n y^{n-2} (c - ax)}$$

$$= n x^{n-2} y^n (c - ax) n x^n y^{n-2} (c - ax) - n x^{n-1} y^{n-1} ax n x^{n-1} y^{n-1} ax$$

$$= n^2 x^{2n-2} y^{2n-2} (c^2 - 2acx + a^2x^2 - a^2x^2) = n^2 x^{2n-2} y^{2n-2} c (c - 2ax)$$

$$= n^2 x^{2n-2} y^{2n-2} c \left(c - \frac{2n}{2n+1} c \right) = \frac{n^2}{2n+1} \overbrace{x^{n-1} y^{n-1} c}^{2} > 0$$

$${}_{xx}\mathfrak{I} + {}_{yy}\mathfrak{I} = (n+1) \left(a^2 + b^2 \right) \left(\frac{n}{2n+1} \right)^{2n-1} \frac{c^{2n-1}}{a^n b^n}$$

$$6x^2 - 2x - 3xy + y^2 + 5y: \quad x^2 + 2xy - 4x + 8y: \quad x^2 - xy + y^2 - 2x: \quad xy + y^2 x$$

$$2x + 6y - x^2 - y^2: \quad xy - x^2 - y^2 - 3x + 2y + 1$$

$$y^3 + y + 4xy - 2x^2: \quad x^3 + y^2 - 6xy: \quad 2y^3 - (x^2 + y^2)^2: \quad x^3 + 8y^3 - 6xy + 5: \quad 2x^3 + 4x^2 + y^2 - 2xy$$

$$x^2 - xy + y \mathfrak{e}: \quad 1 + x^2 - y^2 \mathfrak{e}: \quad -2x^2 - y^2 \mathfrak{e} y: \quad (x^2 + y)^{x/2} \mathfrak{e}: \quad (2x + y^2)^x \mathfrak{e}$$

$$(8x^2 - 6xy + 3y^2)^{2x+3y} \mathfrak{e}: \quad (x^2 - 2y^2)^{x-y} \mathfrak{e}$$

$$x^2 - xy + y^2 - 2x + y: \quad \min_{1:0} = -1$$

$$\sqrt{2x-x^2-y^2}\colon\quad \max_{1:0}=1$$

$${}^{x^2+y^2}\mathfrak{b}\colon\quad \min_{0:0}=0$$

$${(x-y+1)}^4\colon\quad \min_{x:x+1}=0$$

$${(x-y)}^3$$

$$x^2y\,(2-x-y)\colon\quad \max_{1:1/2}=1/4\colon\quad y<0<2<y\curvearrowright \max_{0:y}=0\colon\quad 0< y<2\curvearrowright \min_{0:y}=0$$

$$xy\,(x-y-2)$$

$$xy+\frac{50}{x}+\frac{20}{y}\colon\quad \min_{5:2}=30$$

$${(x+y^2)}^{x/2}\mathfrak{e}\colon\quad \min_{-2:0}=-2/e$$

$$\frac{1+x+y}{\sqrt{1+x^2+y^2}}\colon\quad \max_{1:1}=\sqrt{3}$$

$$x^2+xy-4y$$

$$x^2\,y^3\,(6-x-y)\colon\quad \max_{2:3}=108\colon\quad \text{sad}_{x:0}\colon\quad \max_{0:y}^{y<0<6<y}=0\colon\quad \min_{0:y}^{0<y<6}=0$$

$$x^3-2\,y^3+2y\colon\quad \text{sad}_{0:\pm 1/\sqrt{3}}$$

$$xy\,(x+2y-2)\colon\quad \min_{2/3:1/3}=-\frac{4}{27}\colon\quad xy\,(2x+y-2)\colon\quad \min_{1/3:2/3}=-4/27$$

$$xy\,(x+y-1)\colon\quad \min_{1/3:1/3}=-1/27\colon\quad 4\,x^2+8xy+y^3\colon\quad \min_{-8/3:8/3}=-256/27$$

$$xy\,(x+3y+9)\colon\quad \max_{-3:-1}=9$$

$$xy\,(2x+y+6)$$

$$2\,x^3+x\,y^2-216x\colon\quad \min_{6:0}=-864\colon\quad \max_{-6:0}=864$$

$$6xy-x^3-y^3\colon\quad x^3+3x\,y^2+12xy$$

$$(5-2x+y)^{x^2-y}\mathfrak{e}\colon\quad \text{none}$$

$$\frac{x^3}{3}-x\,y^2+8y$$

$$y^2\,(6-x-y)\colon\quad \max_{x:0}^{x>6}=0\colon\quad \min_{x:0}^{x<0}=0$$

$${}^{x^2+y^2+1}\mathscr{K}\colon\quad \min_{0:0}=0$$

$$x^4+4x+y^2+18y$$

$$(x^2-2y)^{x-y}\mathfrak{e}\colon\quad \min_{1:3/2}=-2/\sqrt{e}$$

$$x^3 + 2xy - 5y^2 + 2: \quad \max_{-2/15: -2/75} = 6754/3357$$

$$y\sqrt{x}-y^2-x+6y$$

$$x^3 + y^2 - 6xy - 48x: \quad \min_{8:24} = -448$$

$$y^3 - 8xy - 4y + 8x^2: \quad \min_{1:2} = -8$$

$$3x^3 + 3x^2y - y^3 - 15x: \quad \min_{\sqrt{5}: -\sqrt{5}} = -20\sqrt{5}: \quad \max_{-\sqrt{5}:\sqrt{5}} = 20\sqrt{5}$$

$$3x^2 + 3y^2 - 4xy - 3x - 2y + 1: \quad \min_{13/10:6/5} = -43/20$$

$$x^4 + y^4 - x^2 - 2xy - y^2: \quad \min_{1:1}^{-1:-1} = -2: \quad \text{sad}_{0:0}$$

$$3x^2 - x\sqrt{y} + y - 8x + 8: \quad \min_{16/11:64/121} = -43/20$$

$$x^3 + 3x^2y - 15x - 12y: \quad \text{none}$$

$$x^2 - xy + 2y^2 - x + 4y - 5: \quad \min (0: -1) = -7$$

$$\frac{x^2}{4} + \frac{y^2}{4} - \frac{xy}{3} \frac{x}{4} - \frac{y}{6} + 1$$

$$x^2 + y^2 - 2x - 4\sqrt{xy} + 8: \quad \min_{2:2} = 0$$