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Exercise 7

Exercise 7.1 - Glyphs

Exercise 7.2 - Isolines

1. $f(-1.5, 1.5) = (-1.5 - 0.5)^2 - 1.5^2 = 1.75 = 1.8$
   $f(-0.5, 1.5) = -1.25 = -1.3$
   $f(0.5, 1.5) = -2.25 = -2.3$
   $f(1.5, 1.5) = -1.25 = -1.3$
   $f(-1.5, 0.5) = 3.75 = 3.8$
   $f(-0.5, 0.5) = 0.75 = 0.8$
   $f(0.5, 0.5) = -0.25 = -0.3$
   $f(1.5, 0.5) = 0.75 = 0.8$
   $f(-1.5, -0.5) = 3.75 = 3.8$
   $f(-0.5, -0.5) = 0.75 = 0.8$
   $f(0.5, -0.5) = -0.25 = -0.3$
   $f(1.5, -0.5) = 0.75 = 0.8$
   $f(-1.5, -1.5) = 1.75 = 1.8$
   $f(-0.5, -1.5) = -1.25 = -1.3$
   $f(0.5, -1.5) = -2.25 = -2.3$
   $f(1.5, -1.5) = -1.25 = -1.3$

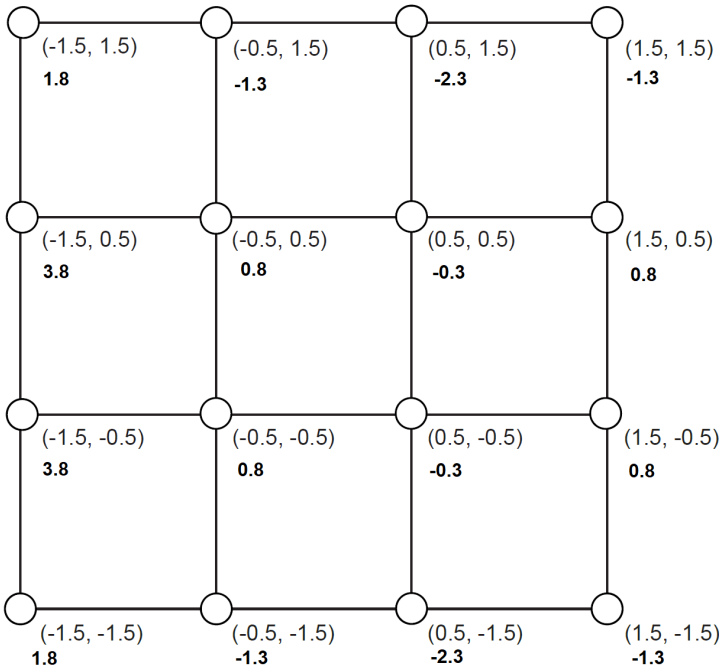

Figure 1: coordinates and function values

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2: mark nodes depending on condition

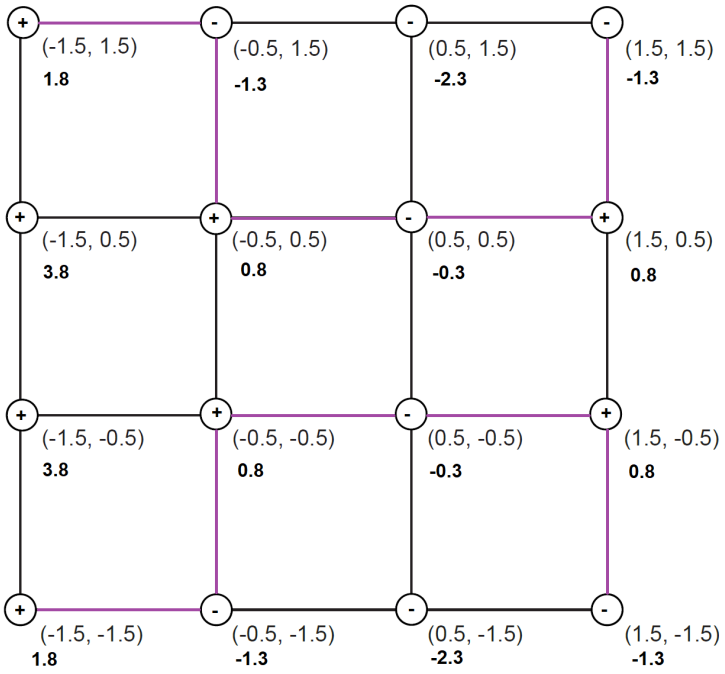

Figure 2: intersected lines: violet

2: find position of intersection on edge by linear interpolation

$$x = \frac{(f_2 - c) \cdot x_1 + (c - f_1) \cdot x_2}{(f_2 - f_1)}$$

$$x_1 = \frac{(-1.3 - 0) \cdot -1.5 + (0 - 1.8) \cdot -0.5}{(-1.3 - 1.8)} = \frac{1.95 + 0.9}{-3.1} = -0.91935$$

$$y_2 = \frac{(0.8 - 0) \cdot 1.5 + (0 + 1.3) \cdot 0.5}{(0.8 + 1.3)} = \frac{1.85}{2.1} = 0.881$$

$$x_3 = \frac{(-0.3 - 0) \cdot -0.5 + (0 - 0.8) \cdot 0.5}{(-0.3 - 0.8)} = \frac{-0.25}{-1.1} = 0.227$$

$$x_4 = \frac{(0.8 - 0) \cdot 0.5 + (0 + 0.3) \cdot 1.5}{(0.8 + 0.3)} = \frac{0.85}{1.1} = 0.773$$

$$y_5 = \frac{(0.8 - 0) \cdot 1.5 + (0 + 1.3) \cdot 0.5}{(0.8 + 1.3)} = \frac{1.85}{2.1} = 0.881$$

$$x_6 = \frac{(-0.3 - 0) \cdot -0.5 + (0 - 0.8) \cdot 0.5}{(-0.3 - 0.8)} = \frac{-0.25}{-1.1} = 0.227$$

$$x_7 = \frac{(0.8 - 0) \cdot 0.5 + (0 + 0.3) \cdot 1.5}{(0.8 + 0.3)} = \frac{0.85}{1.1} = 0.773$$

$$x_8 = \frac{(-1.3 - 0) \cdot -1.5 + (0 - 1.8) \cdot -0.5}{(-1.3 - 1.8)} = \frac{1.95 + 0.9}{-3.1} = -0.91935$$

$$y_9 = \frac{(-1.3 - 0) \cdot -0.5 + (0 - 0.8) \cdot -1.5}{(-1.3 - 0.8)} = \frac{1.85}{-2.1} = -0.881$$

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$$y_{10} = \frac{(-1.3 - 0) \cdot -0.5 + (0 - 0.8) \cdot -1.5}{(-1.3 - 0.8)} = \frac{1.85}{-2.1} = -0.881$$

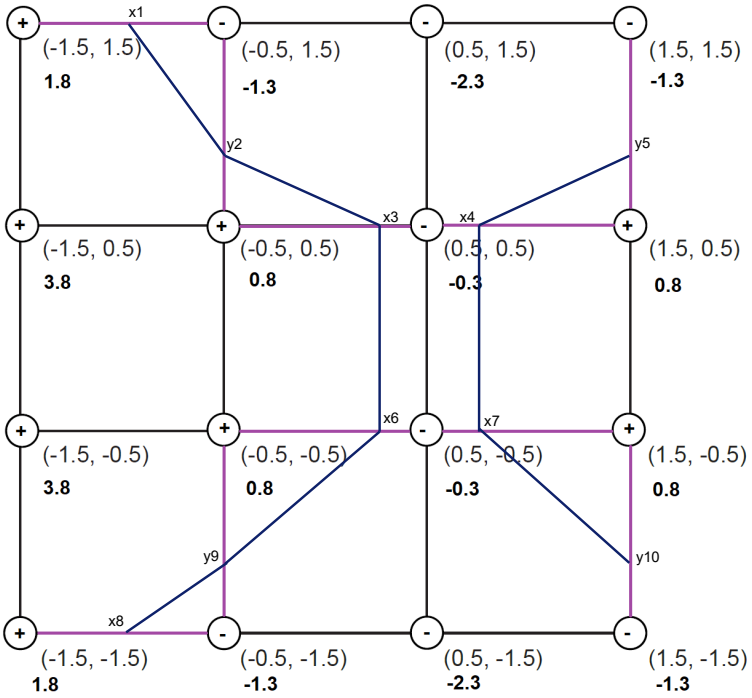

Figure 3: isolines: blue