```
src/bii-vis.py
                       Mon Apr 08 14:24:49 2024
                                                           1
    1: import matplotlib.pyplot as plt
       import numpy as np
    3:
       import sys
    4:
    5:
    6: def f(x, y):
            return 3 * (x - 5) **4 + 10 * (y - 9) **2
    7:
    8:
    9:
   10: def g(x, y):
            return np.maximum(x - 5, 0) + 10 * np.abs(y - 9)
   11:
   12:
   13:
   14: def main (outfile):
            x = np.linspace(0, 10, 400)

y = np.linspace(0, 18, 400)
   15:
   16:
   17:
            X, Y = np.meshgrid(x, y)
            Z_f = f(X, Y)
   18:
            Z_g = g(X, Y)
   19:
   20:
   21:
            fig = plt.figure(figsize=(12,
   22:
            ax = fig.add_subplot(1, 2, 1, projection='3d')
ax.plot_surface(X, Y, Z_f, cmap='viridis')
   23:
   24:
   25:
            ax.set_title('\$f(x, y)\$')
   26:
            ax.set_xlabel('$x$')
   27:
            ax.set_ylabel('$y$')
   28:
            ax.set_zlabel('$f(x, y)$')
   29:
   30:
            ax = fig.add_subplot(1, 2, 2, projection='3d')
   31:
            ax.plot_surface(X, Y, Z_g, cmap='magma')
   32:
            ax.set\_title('\$g(x, y)\$')
   33:
            ax.set_xlabel('$x$')
            ax.set_ylabel('$y$')
   34:
            ax.set_zlabel('\$g(x, y)\$')
   35:
   36:
            plt.savefig(outfile)
   37:
   38:
            plt.show()
   39:
   40: def main_contour(outfile):
   41:
            x = np.linspace(0, 10, 400)
   42:
            y = np.linspace(0, 18, 400)
   43:
            X, Y = np.meshgrid(x, y)
   44:
            Z_f = f(X, Y)
            Z_g = g(X, Y)
   45:
   46:
   47:
            fig = plt.figure(figsize=(12, 6))
   48:
            ax = fig.add_subplot(1, 2, 1)
   49:
   50:
            ax.contourf(X, Y, Z_f, levels=30, cmap='viridis')
            ax.set_title('$f(x, y)$')
   51:
            ax.set_xlabel('$x$')
   52:
            ax.set_ylabel('$y$')
   53:
            \# ax.set\_zlabel('\$f(x, y)\$')
   54:
   55:
   56:
            ax = fig.add\_subplot(1, 2, 2)
   57:
            ax.contourf(X, Y, Z_g,
                                     levels=30, cmap='viridis')
            ax.set_title('\$g(x, y)\$')
   58:
   59:
            ax.set_xlabel('$x$')
   60:
            ax.set_ylabel('$y$')
   61:
            # ax.set_zlabel('$g(x, y)$')
   62:
   63:
            plt.savefig(outfile)
   64:
            plt.show()
   65:
   66:
   67: if ___name__
                    68:
            if len(sys.argv) != 2:
                print("Usage: python script.py <output_file>")
   69:
   70:
                sys.exit(1)
   71:
   72:
            outfile = sys.argv[1]
   73:
            main_contour(outfile)
   74:
```