Special Problem 3: Astronaut Arthur and the Planet Shmoo

(with thanks to Sheldon Glashow)

Given a substance of fixed density and volume, what shape maximizes the gravitational force at a given surface point? How much better does it do than a sphere?

[The story: The planet Shmoo is a live planet. It has the same average density as Earth, and its surface is indistinguishable from that of Earth. Astronaut Arthur lands on Shmoo, and is inclined to think that he has landed on Earth. However Shmoo is a friendly planet, and would like to rescue Arthur from his erroneous impression, by giving him the biggest gravitational hug he can. Shmoo has uniform density, which he cannot change, but he can change his shape. How should he do it? How big is best hug?]