Math 223

Week 11 Solutions to Selected Problems

Section 13.2

7.

$$\int_C xy^3 \, ds = \int_0^{\frac{\pi}{2}} (4\sin t)(4\cos t)^3 \sqrt{(4\cos t)^2 + (-4\sin t)^2 + (3)^2} \, dt =$$

$$4^4 \cdot 5 \cdot \int_0^{\frac{\pi}{2}} \sin t \cos^3 t \, dt = \left. \frac{-1280\cos^4 t}{4} \right|_0^{\frac{\pi}{2}} = 320.$$

Section 13.3

27. Open: Every (x, y) can be enclosed inside a disk which is entirely inside the region. Connected: every two points in the region can be connected by a path that stays inside the region. Simply connected: the regions has no holes. In other words, any simple closed curve in the region can be shrunk to a point inside the region.

29. Open: Every (x, y) can be enclosed inside a disk which is entirely inside the region. Connected: every two points in the region can be connected by a path that stays inside the region. Not simply connected: the region has a rather large hole, namely all coordinates within 1 unit of the origin. If you take a circle of radius 1.5, which is inside the region, you cannot shrink it to a point inside the region because it is being blocked by the circle of radius 1.