

Warm-up Problems - February 1, 2006

Solutions

1. Plot the following in $\mathbb{R}^3$ (Hint: these are all planes.)

(a) $z = -1$

(b) $z = 3$

(c) $x = -1$

(d) $x = 3$

(e) $y = -1$

(f) $y = 0$

(g) $y = 3$

Lecture Problems

2. Let $z = f(x, y) = 4x^2 + y^2$. Describe the cross sections and graph.

(a) $x = 0$

Solution: This is a parabola $z = y^2$

(b) $x = 1$

Solution: This is a parabola $z = y^2 + 4$

(c) $x = -1$

Solution: This is a parabola $z = y^2 + 4$

(d) $y = 0$

Solution: This is a parabola $z = 4x^2$

(e) $y = 1$

Solution: This is a parabola $z = 4x^2 + 1$

(f) $z = 0$

Solution: This is a point $x = 0, y = 0$

(g) $z = 1$

Solution: This is an ellipse $1 = 4x^2 + y^2$

(h) $z = 2$

Solution: This is a larger ellipse $2 = 4x^2 + y^2$

(i) $z = -1$

Solution: This is nothing! $-1 = 4x^2 + y^2$