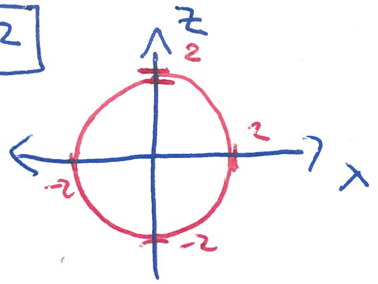
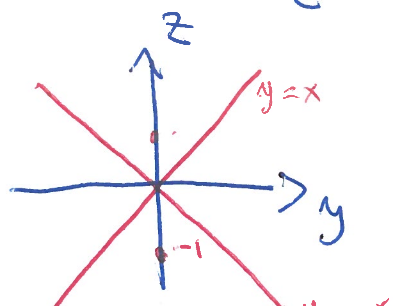
HW 2 Sols

§ 10.1 - 24

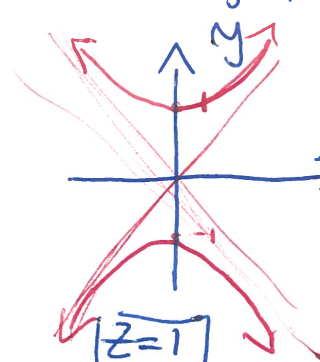
(b) fits best. [for a given y the trace is a circle so $y^2 = x^2 + z^2$. ✓

$y=2$





$x=0$



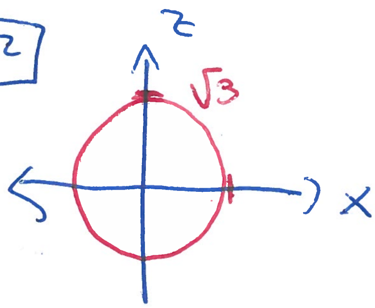
$z=1$

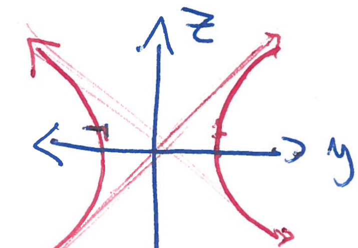
§ 10.1 - 26

(a) fits better [(b) only depends on the distance from z]

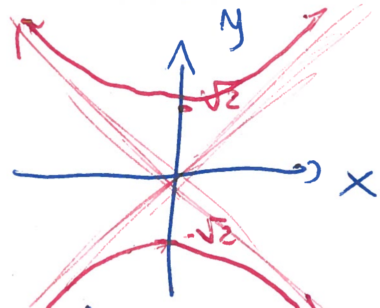
$y^2 = 1 + x^2 + z^2$.

$y=2$





$x=0$



$z=1$

§ 12.2 - 18

$$\lim_{(x,y)\to(0,0)} \frac{\sin(x^2)}{y}$$

(a) $y = mx$ $\quad \displaystyle\lim_{x\to 0} \frac{\sin(x^2)}{mx} = \frac{1}{m} \lim_{x\to 0} x \cdot \boxed{\frac{\sin(x^2)}{x^2}} = 0$

≈ 1.

↑ L'hopital or inspection

(b) $y = x^2$ $\quad \displaystyle\lim_{x\to 0} \frac{\sin(x^2)}{x^2} = 1$.

So $\displaystyle\lim_{(x,y)\to(0,0)} \frac{\sin(x^2)}{y}$ does not exist because the limit along two curves is different.

§ 12.3 – 8 $\qquad f(x,y) = \ln(xy).$

$$\frac{\partial f}{\partial x} = \frac{y}{xy} = \frac{1}{x} \qquad \frac{\partial f}{\partial y} = \frac{x}{xy} = \frac{1}{y}.$$

thus $\frac{\partial f}{\partial x}(-2,-3) = -1/2 \qquad \frac{\partial f}{\partial y}(-2,-3) = -1/3.$

§ 12.3 – 14 $\qquad f(x,y) = e^{x+2y}$

$$f_x(x,y) = e^{x+2y} \qquad f_y(x,y) = 2e^{x+2y}$$

$$f_{xx}(x,y) = e^{x+2y} \qquad f_{yy} = 4e^{x+2y}$$

$$f_{xy}(x,y) = f_{yx}(x,y) = 2e^{x+2y}$$

§ 12.3 – 28 $\qquad \boxed{f(x,y) = \frac{(x+y)^2}{2}}$

CHECK: $f_x(x,y) = \frac{2(x+y)}{2} = x+y = f_y(x,y).$

§ 12.4 – 20

$$z \approx z_0 + \frac{\partial f}{\partial x}(x_0,y_0)(x-x_0) + \frac{\partial f}{\partial y}(x_0,y_0)(y-y_0)$$

so $z \approx 13 + 2.6(-0.12) + 5.1(0.07)$

$\approx \boxed{13.045}$

§ 12.7 – 20 $\qquad f(x,y) = x^2 - 2x - y^2 + 4y \qquad P = (1,2).$

$f_x(x,y) = 2x - 2 \qquad f_y(x,y) = -2y + 4 \qquad f(1,2) = 1 - 2 - 4 + 8 = 3$

$z = 3 + 0(x-1) + 0(y-2)$ so $\boxed{z = 3}$