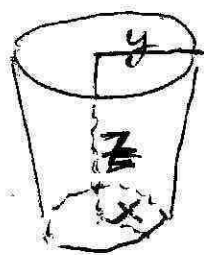


① Find the point on the hyperbola $x^2 - y^2 + xy = 1$ closest to $(0, 1)$. HW30

② Find the point on the ellipsoid $\frac{x^2}{1^2} + \frac{y^2}{2^2} + \frac{z^2}{3^2} = 1$ farthest from $(-3, 4, -5)$.

③ Reconsider the cup problem from HW27:
Given a surface area of $S = 400 \text{ cm}^2$,



what is the maximum possible volume V ?

(Again: $S = \pi x^2 + \pi(x+y)\sqrt{z^2 + (y-x)^2}$; ~~$V = \frac{\pi z}{3}(x^2 + xy + y^2)$~~

$$V = \frac{\pi z}{3} (x^2 + xy + y^2).$$

④ Find the min. & max. of $3x + 2y + z$ on the curve $\{(x, y, z) \mid x^2 + y^2 + z^5 = 5 \text{ and } xyz = 2\}$.