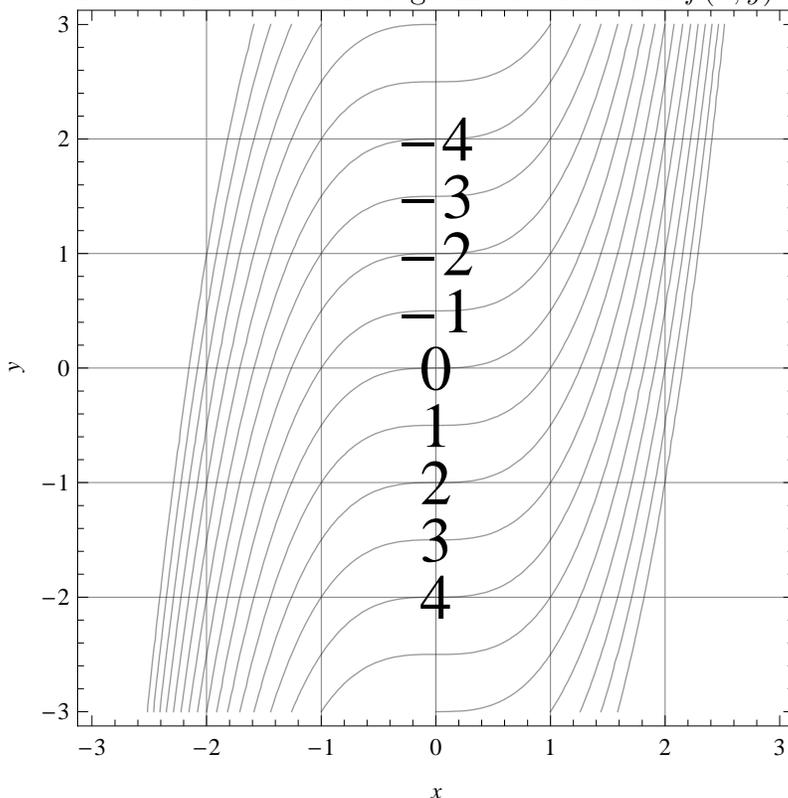


Math 2130 Homework 3: 17.1, 17.2, 14.1, 14.2

- (1) Parameterize the circle in the xz plane of radius 3 centered at $(0, 0, 1)$.
- (2) Parameterize the line **segment** from the point $(1, 2, 3)$ to the point $(3, 2, 1)$.
- (3) Describe precisely the curve parameterized by the function $r(t) = (e^t, (e^t)^2)$ from $t = 0$ to $t = 1$.
- (4) Do the curves parameterized by $v(t) = (t^2, t + 1)$ from $t = 0$ to $t = 4$ and $w(t) = (t, t - 1)$ from $t = 0$ to $t = 4$ intersect? If so, where?
- (5) If two particles follow the paths in the above problem, will they collide? Will they cross paths?
- (6) You have a vertically-oriented helical spring and shine a light straight down the central axis (imagine the light source is so far away that the light beams are perfectly vertical). What will its shadow look like? What if you shine light on it from the side (perpendicular to the central axis with perfectly horizontal light beams)?
- (7) If the position of a particle at time t is given by $r(t) = (e^t, \sin(t))$:
 - (a) What is its velocity vector at time t ?
 - (b) What is its velocity vector at time $t = 0$?
 - (c) Parameterize the tangent line to the curve at $t = 0$.
 - (d) What is its acceleration vector at time $t = 0$?
- (8) Let $f(x, y) = x^y$. Compute $f_x(x, y)$ and $f_y(x, y)$.
- (9) Knowing that $f_x(1, 2) > 0$ tells you something specific about a specific cross section of the graph of f . Which cross section, and what does it tell you?
- (10) Shown below is a contour diagram of a function $f(x, y)$. Approximate $f_y(0, 0)$.



- (11) Let $f(x, y) = 2xy$. Compute $f_x(2, 3)$ and $f_y(2, 3)$.