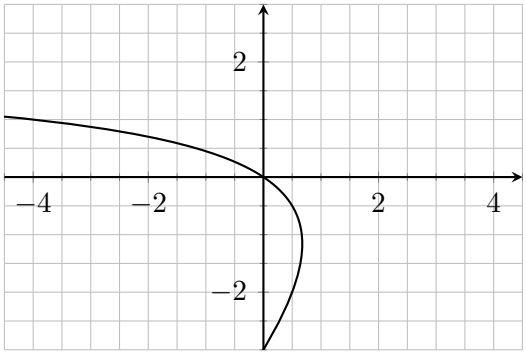
SECTION 3.5 IMPLICIT DIFFERENTIATION

1. Find $\frac{dy}{dx}$ for $2x + 3y = xy - y^2$ and find the equations of tangents to the graph when $x = 0$. Use the portion of the curve shown below as an aid and to determine the plausibility of your answers.



2. Find $\dfrac{da}{db}$ for $a^3 \sin(3b) = a^2 - b^2$. (Pay attention here: b is the independent variable (like x) and a is the dependent variable (like y).

3. Find $\frac{dy}{dx}$ for $e^{xy} = x + y + 1$

4. You are going to derive the formula for the derivative of inverse tangent the way we found the derivative of inverse sine in the video.

   (a) Find dy/dx for the expression $x = \tan(y)$.

   (b) Use the identity $1 + (\tan(\theta))^2 = (\sec(\theta))^2$ to rewrite you answer in part (a) and *write your dy/dx in terms of x only*.

   (c) Now fill in the blank $\dfrac{d}{dx}\left[\arctan(x)\right] =$

   (d) Use your knowledge of the *graph* of $f(x) = \arctan(x)$ to decide if your answer seems plausible...

5. Find the derivative of $f(x) = x \arctan x$.

6. Find the derivative of $f(x) = \arctan(4 - x^2)$.