

**REQUIRED REFERENCE**

Maple Directions and Reference Page (hard copy or linked to your class homework page)  
Maple Implicit Lab

**Open and save a new “document mode” Maple worksheet in your home directory.**

1.  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$ 
  - a. Define the equation,  $f$ ,  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$
  - b. Implicitly plot the curve  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$  from  $-1 \leq x \leq 5$  and  $-1.5 \leq y \leq 2.5$
  - c. Use Maple to determine  $\frac{dy}{dx}$  for  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$
  - d. Use Maple to find all 8 locations on  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$  where there is a horizontal tangent line (change x ranges and y range to find more than one point in the same quadrant. Note: probe > nearest datum is useful).
  - e. Implicitly plot  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$  and all of the horizontal tangent lines you found in #1d together. Use two decimal places of accuracy.
  - f. Use Maple to find every location on  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$  where there is a vertical tangent line (change the x range to find the points).
  - g. Implicitly plot  $y(y^2 - 1)(y - 2) = x(x - 1)(x - 2)$  and all of the vertical tangent lines you found in #1f together.
2.  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$  is the “lemniscate” curve (#37 from your text)
  - a. Define the equation  $L$ ,  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$
  - b. Use Maple to determine  $\frac{dy}{dx}$  for  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$
  - c. Find (and assign) the slope,  $m$ , of the tangent line to  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$  at the point (3 1).
  - d. Find (and assign) the equation of the tangent line,  $T$  to  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$  at the point (3, 1).
  - e. Implicitly plot  $2(x^2 + y^2)^2 = 25(x^2 - y^2)$  and the tangent line,  $T$ , together using a good display window.

3.

a. Define at least 12 different hyperbola functions of the following forms:

$$x * y = n$$

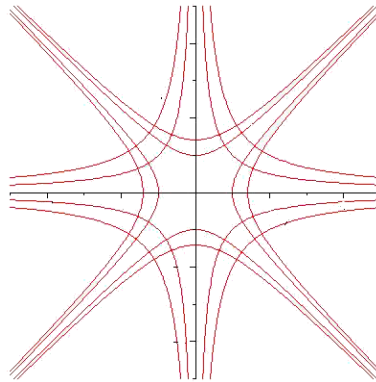
$$x * y = -n$$

$$x^2 - y^2 = n$$

$$x^2 - y^2 = -n$$

$n$  can be any whole number and you should pick different values for  $n$  to make different interesting curves. Name your curves h1, h2, h3, etc.

b. Implicitly plot all 12 functions (h1, h2, h3, ...) together and make a nice colored picture. Full credit only for a fun graph.



**Email subject line: Maple Implicit Written**