Cobweb Notes

John Mason 2011

## Purpose

To promote appreciation:

that graphs are there to be worked on and with, not simply pictures as the end product of a task;

of the use of coordinates to make sense of graphs;

of the variation in shape that cubic and quartic graphs can take;

## Applets

*Double Cobwebs* offers cobweb diagrams involving two functions.

*Iterations* offers cobweb diagrams involving one function.

The animation *Cyclic Cobweb* displays a curious property of hyperbolae.

## Buttons

The grey line other than the axes is the line *y*=*x*. Sometimes you need to click on the grey background before clicking on a button.

The polynomial degrees are set by clicking-and-holding on the appropriate button while typing a number from 2 to 7. The polynomials can then be adjusted by moving their specifying points. These can be adjusted to see how the curve can be changed.

**Pts** hides the points to clear the screen

**Reset** redraws the original curves of the current degrees by putting the specifying points back where they started.

**Path1** and **Path2** show a construction which can be animated by the play-pause buttons bottom left, or simply dragged by the user using the red point marked *x*.

**Locus1** and **Locus2**show the loci of the while point in the path constructions.

**Alignment** displays horizontal and vertical lines for emphasising alignments between extreme values of the curves.

**Images** displays the *x*-value *as a* y-value for locating images of one function as input to a second function.

Sometime is there is a residual white-dot where the last selected point was: clicking anywhere away will remove it.

## Tasks

#### What is the construction indicated by animating the red ‘x’ point? Describe the construction.

#### What function is traced out by the white end-point of the construction?

#### What degree polynomial would you expect for the compound or composite function?

#### What alignments appear to occur between extreme values of the component and the compound or composite functions? Are these particular or are these general?

#### What alignments appear to occur between where extreme values are taken? Are these particular or are these general?

#### What relationships between the two initial polynomials guarantees that both composites will display their appropriate degree?

## Comments

Comments and suggestions to j.h.mason@open.ac.uk are most welcome.