

## Tutorial #4 (for week 7) (Feb 20, 2004)

17th February 2004

The following questions will be considered during the tutorial sessions on Friday. I am expecting answers to the questions, and you should be prepared to demonstrate your programs on the PC in the tutorial.

**Q1 (RESEARCH):** The MVC (Model View Controller) programming pattern (?) is an old software pattern, first described over 25 years ago, and first implemented in the language `smalltalk-80`. This language had certain properties that encouraged the development of this sort of software pattern.

- (a) what is the specific property of `smalltalk-80` that “*encouraged the development of this sort of software pattern*”?
- (b) Swing uses a *modified* MVC architecture. What is the modification?

**Q2:** Write Tcl code that creates a new Tcl command structure - the **recurse x y until lessthan z** command. This command should execute the function `x` passing it a single parameter. The return value is tested to see if it is less than `z`. If **yes**, then the command returns the number of recursions done. If **no**, then it recurses again, using the previous return value as the new `y` value. for example - if we had a function `half` which returns its argument divided by two, then **recurse half 17 until lessthan 1** should return 5.

**Q3:** Modify the Tk application `tkpaint` (found at `~cs3283/ftp/tkpaint`) to *save* and *restore* paintings.

**Q4:** Modify the Tk application `tkpaint` (found at `~cs3283/ftp/tkpaint`) to use a menu system instead of the buttons