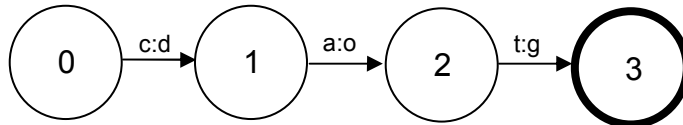# Computational Machines

by Tom Payne

The following is a diagram of a machine that changes the English word "cat" into the English word "dog". All such machines start with a circle numbered "0" and end with a darker circle. The numbers other than "0" don't really matter:

Machine #1. Input: "cat" Output: "dog"

Here is another machine that does the same thing, but will also change the nonsense word "tac" into "god" (If you try to process "tac" with machine #1 it will choke and die):

Machine #2. Input: "cat" Output: "dog",
Input: "tac" Output "god"
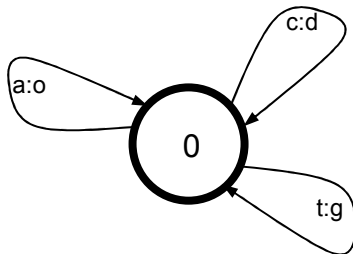
Machine #2 will actually accept an infinite number of inputs, most of which are not words in any language, for example cccc, ccat, caaat, ccccccccccccttttttttttttttttt, tttttttttt . . . *ad infinitum*.

Problem #1: Explain how this can be.

Now, here is a machine that will process the name "Kate" and produce several distinct outputs:

Machine #3. Input: "Kate" Outputs: ??
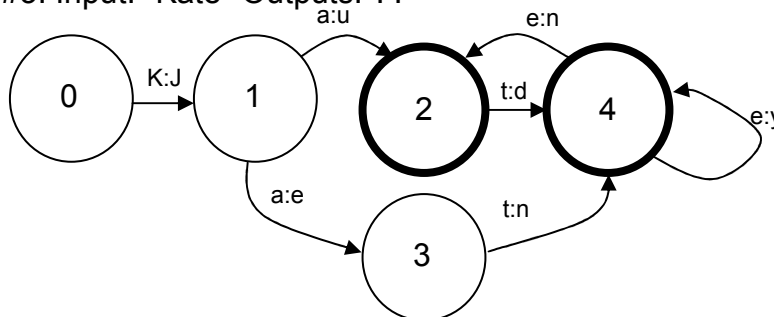
Problem 2: Is the number of permissible inputs for Machine #3 infinite? Why or why not?

Problem 3: What are two common 4-letter girl's names that are permissible outputs of Machine #3?

Problem 4: Now draw your own machine that will change "Tom Cruise" into "Ali Landry" using four or fewer circles (your machine must start over when it encounters a space).