

## ***Questionnaire – Feature Models***

### **CSC2125 – Fall 2012**

With product design, it is common to see different product lines from a company, each version of a product having its own features. These features define how this product is unique from similar products. This feature-set helps designers and engineers create the needed components for a specific product model. These features can affect many different job areas – software engineering included.

In software engineering these unique features are generally presented on different UML diagrams. The problem is that there is no standardization for how to display this information. Consequently everyone demonstrates unique features in their own way. Since features can be almost anything (i.e. triggers, actions, properties, states, timings, etc.), any UML diagram could potentially have the need to demonstrate features.

For this project, I am focusing on state charts. I am trying to create a set of principles that a software engineer can follow when creating a state chart that will help make the different features in a feature-set obvious, easy to identify, and quick to understand.

In the following questions, I present several different aspects that I am examining to demonstrate different ways of presenting some of this information. I would like to ask your opinion on these items to help me figure out what principles work best.

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## Part 1 - Unique Feature-Set Links

In the following questions I am examining the links between states.

It is possible that the transitions from state A to state B can happen for all models, or it is possible (due to the feature set) that a link is only available in one (or some) of the different feature models.

For example:

Say we have a product which is a pencil. There are 3 different types of pencils:

**Pencil 1** - is the standard HB - yellow painted pencil with an eraser on the back

**Pencil 2** - is a simple HB mechanical pencil with an eraser on the back

**Pencil 3** - is a special pencil that has no eraser, but can stand on its tip without anyone holding onto it.

Pencil 3 can go from state “Waiting” to state “Standing on End”



However, pencil 1 and pencil 2 do not have this transition. Pencil 1 and 2, however, might have the transition “Waiting” to “Erasing” -



A transition that pencil 3 does not have.

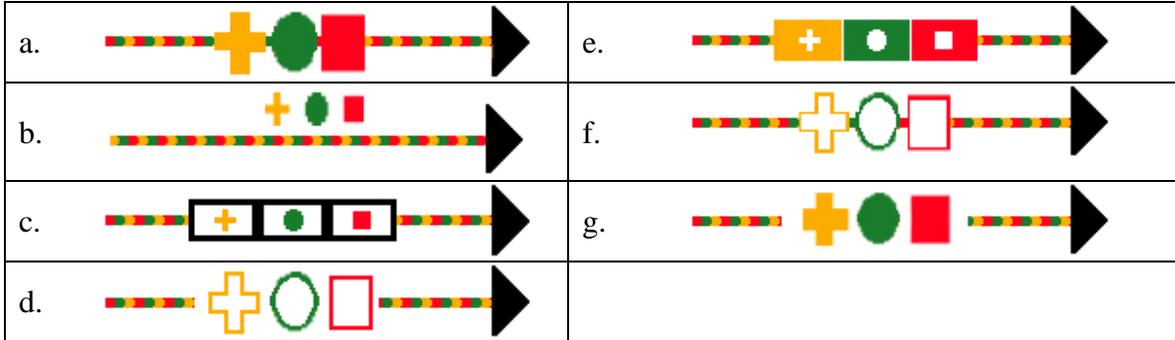
To differentiate between different products, I am using two indicators to help a person viewing a UML diagram.

- 1) a feature set will have a unique color (i.e. red, blue, yellow, green, etc.)
- 2) a feature set will have a symbol associated with it (i.e. a triangle, circle, square, cross, etc).

### Question 1

The following are arrows that would connect two states in a state chart. The arrows below represent three feature models that have been combined. These arrows are used for a state chart that has combined the yellow – cross, the green – circle, and the red – square feature-sets.

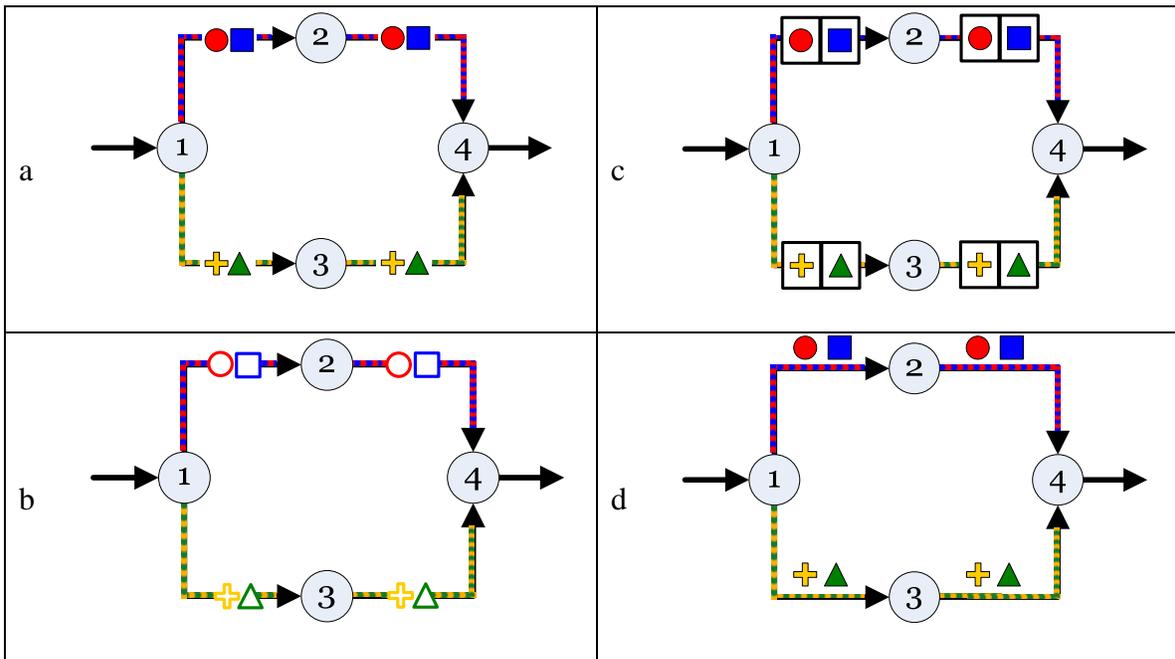
In your opinion, which arrow is clearest?



### Question 2

The following examples show a simple model combining four feature-sets (the blue – square, red – circle, yellow – cross, and green triangle).

In your opinion, which graph is clearest?



### Question 3

The following are arrows that would connect two states in a state chart. The arrows below are for the feature model that is represented by the “blue – triangle”.

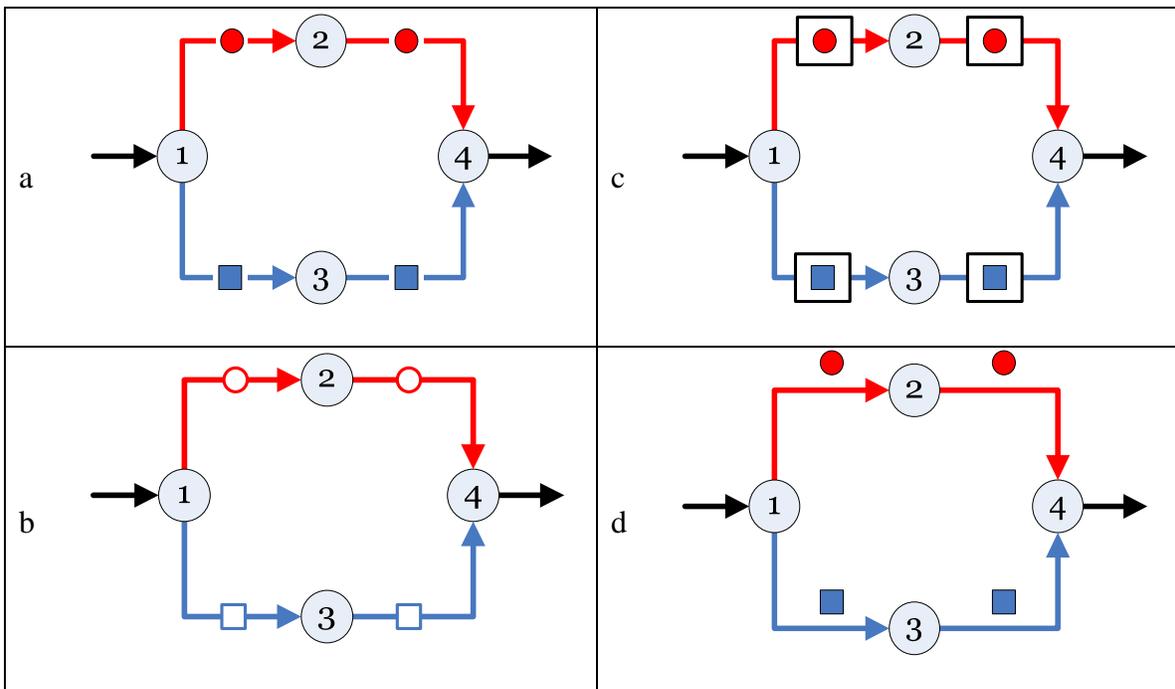
In your opinion, which arrow is clearest?

a. 	e. 
b. 	f. 
c. 	g. 
d. 	

### Question 4

The following examples show a simple model combining two feature-sets (the blue – square and red – circle).

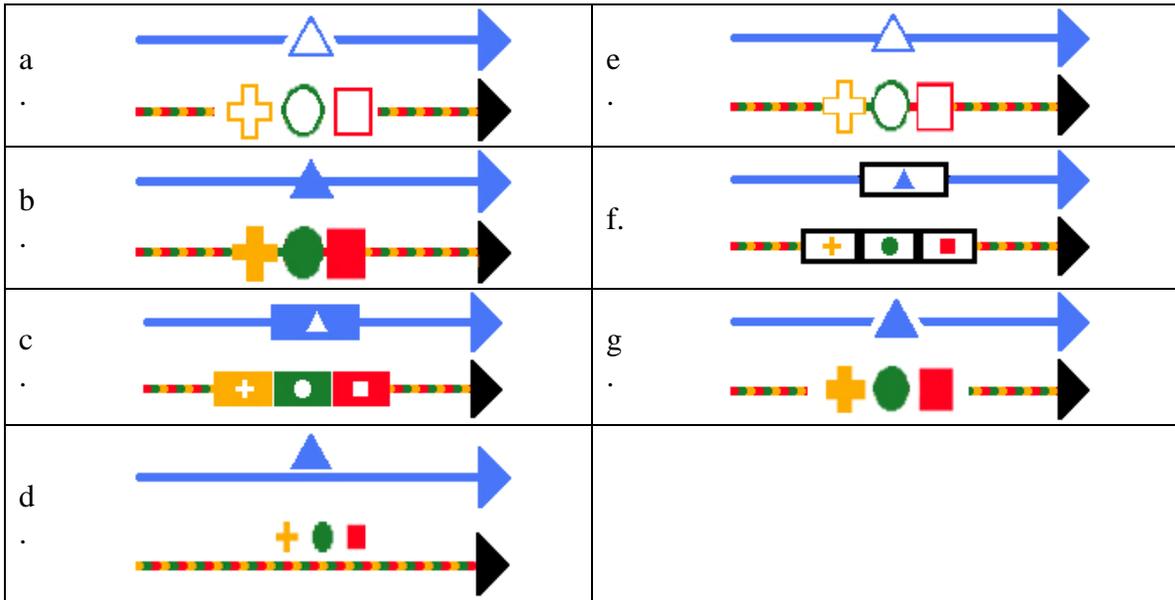
In your opinion, which graph is clearest?



### Question 5

The following arrow pairs show the arrows that would connect two states in a state chart for both a single feature-set as well as a combined multiple feature-set graph.

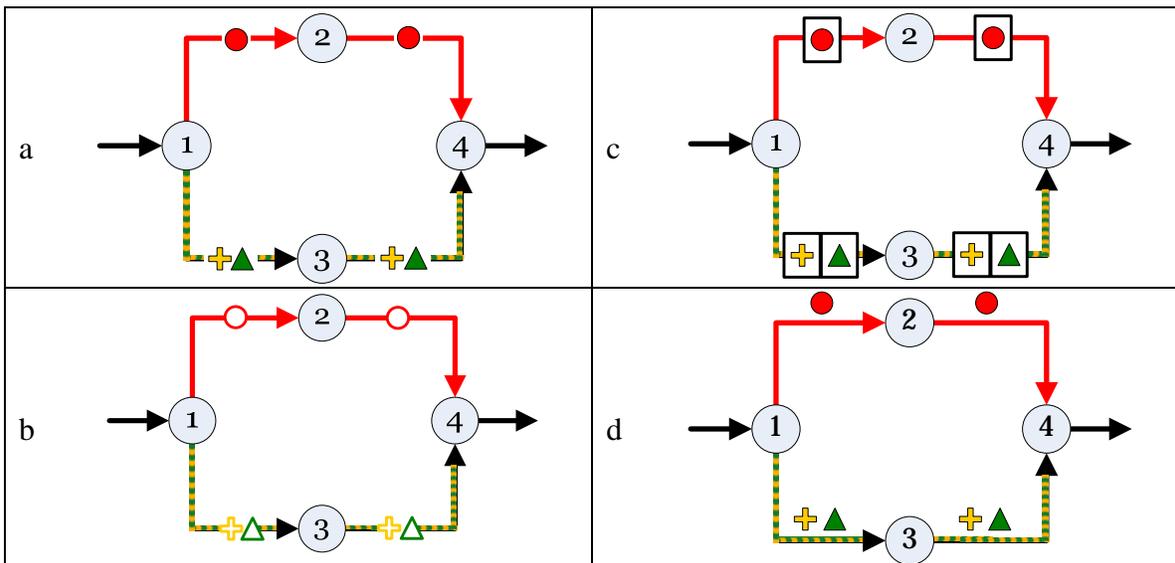
In your opinion, which combination of feature-set arrows is clearest?



### Question 6

The following examples show a simple model combining three feature-sets. The red-circle feature-set has a unique state progression, while the yellow-cross and green-triangle share a state progression.

In your opinion, which graph is clearest?



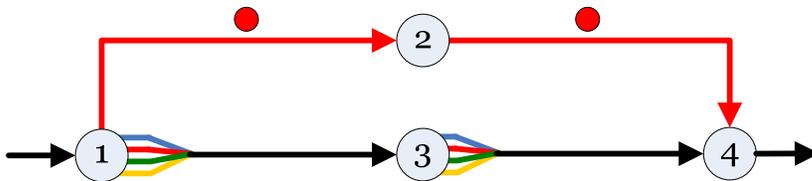
### Question 7

If you saw this arrow in a state diagram, based on what you've seen so far, what do you think this arrow means?



### Question 8

Seeing that same (previous) arrow in a state diagram, what do you think the multi-color to black-line arrow means? (if you still think it means the same thing as in question 7 write "Same as above")



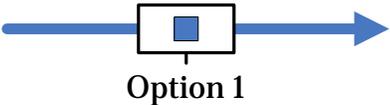
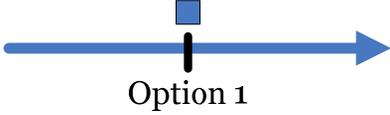
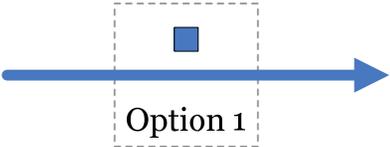
### Question 9

In the previous diagram (from Question 8), which feature-sets can exist in state 3? (Circle all that apply.)

- a. Blue
- b. Red
- c. Green
- d. Yellow

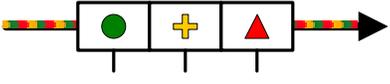
### Question 10

Rate the following arrows from 1-4, indicating which image most clearly associates “Option 1” with the “blue – square” feature-set arrow. (1 = Most Clear; 4 = Least Clear)

 <p>Option 1</p>	 <p>Option 1</p>
 <p>Option 1</p>	 <p>Option 1</p>

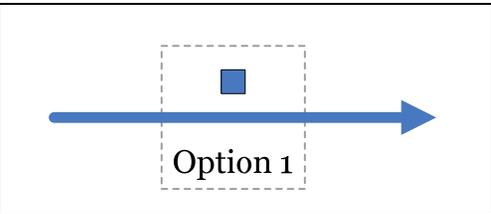
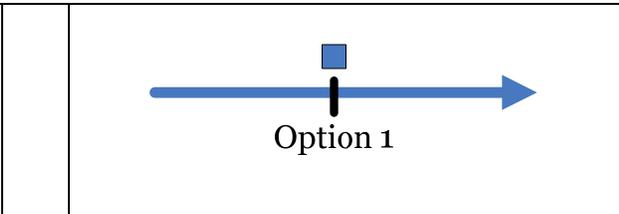
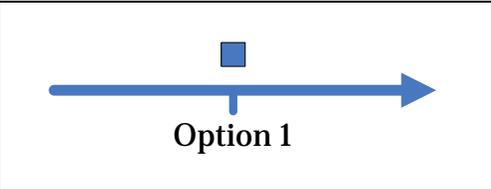
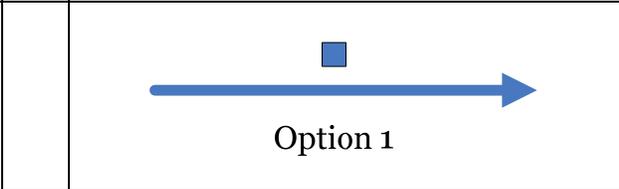
### Question 11

Rate the following arrows from 1-4, indicating which image most clearly associates “Option 2” with the multi-feature-set arrow. (1 = Most Clear; 4 = Least Clear)

 <p>Option 2</p>	 <p>Option 2</p>
 <p>Option 2</p>	 <p>Option 2</p>

### Question 12

Rate the following arrows from 1-4, indicating which image most clearly associates “Option 1” with the “blue – square” feature-set arrow. (1 = Most Clear; 4 = Least Clear)

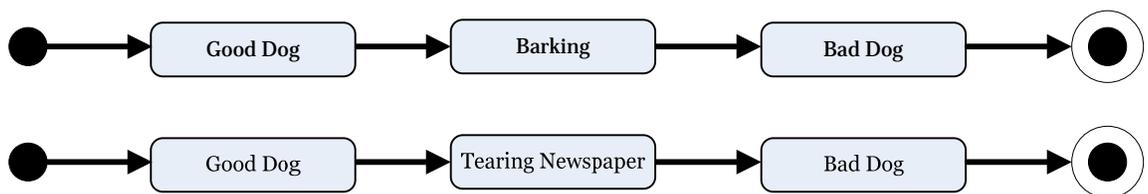
### Part 2 – Multi-State Nodes

In the first part, we examined the link between nodes in a state diagram. In this section we are looking at the states themselves.

### Question 13

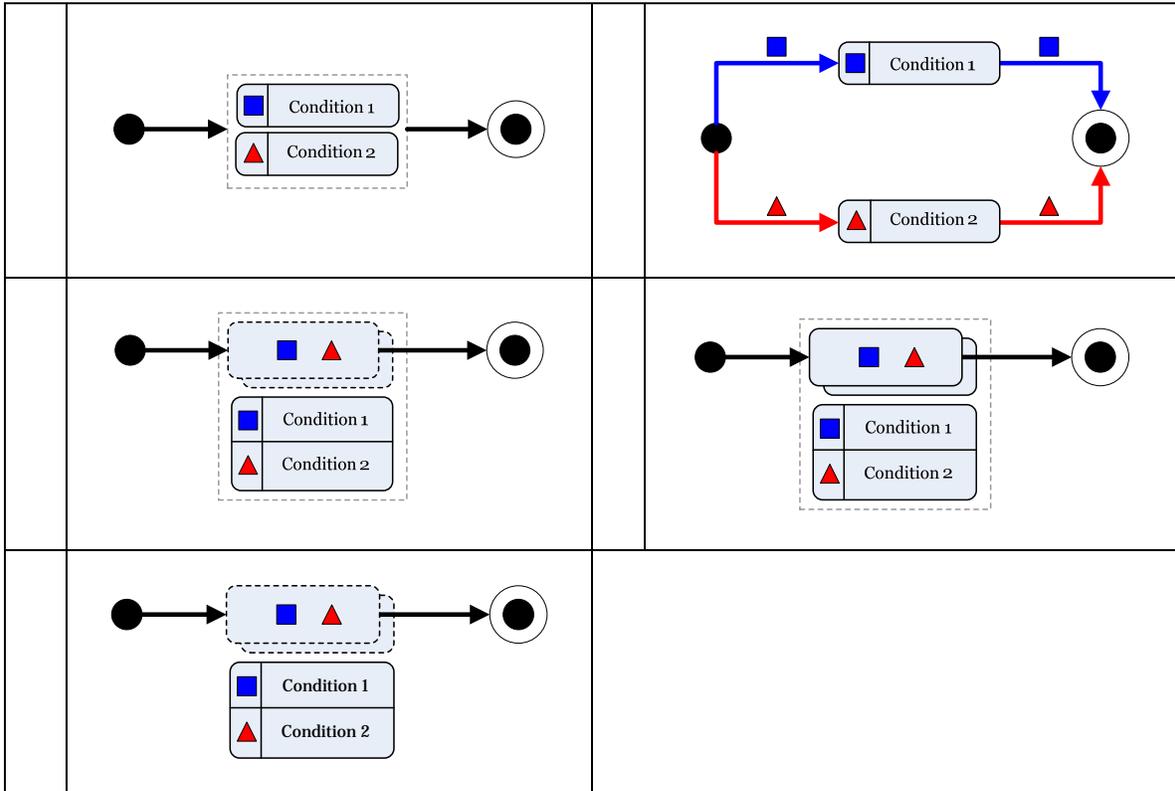
It is not uncommon for different feature models to have a unique middle state between two states that are similar. When shown in a diagram, this unique state would occupy the same space.

For example, if we had a dog, we may see the following two models:



In this case, both “Barking” and “Tearing Newspaper” occupy the same space in the graph, however, indicate different information.

With the following images, rate the models from 1 – 5 indicating which graph mostly clearly represents this concept (1 = most clear, 5 = least clear).



### Question 14

Describe how you would interpret the following image for the two paths (▲ Path 1, ■ Path 2)

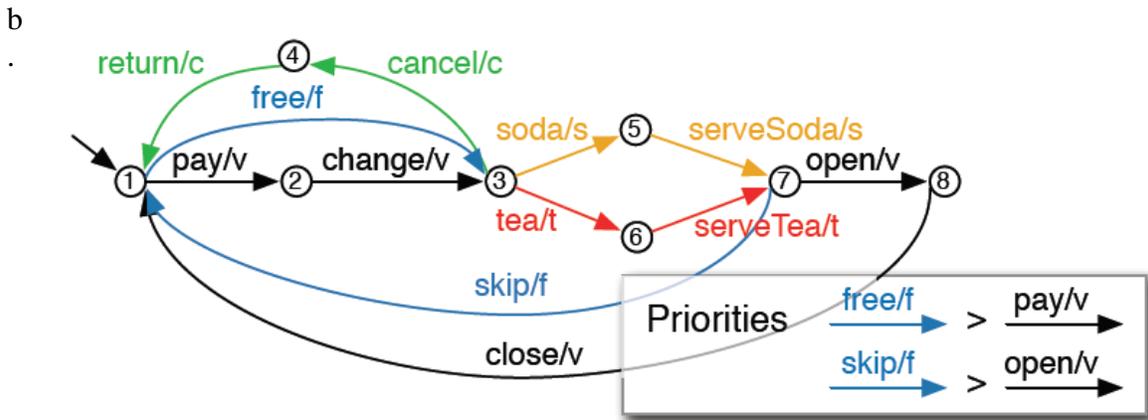
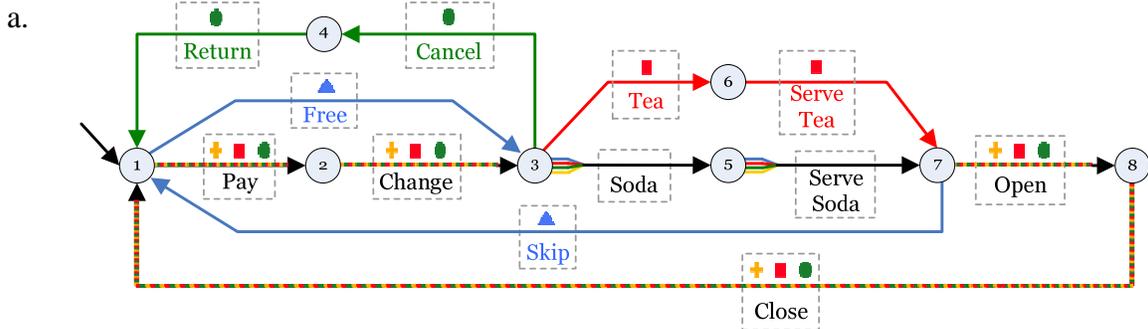


### Part 3 – Full diagrams

In the first two parts, we examined parts of a state-chart. In the following questions we will explore state-charts with the pieces combined.

#### Question 15

Consider the following graphs that show the combined features for four different vending machine models (as seen in class). A **green** model has a cancel option; a **yellow** model only serves soda; a **red** model serves tea and soda; and a **blue** model dispenses soda for free.



#### Part 15a

Which graph displayed the different models clearest?

a

b

### Part 15b

What do you think made this graph the easiest to understand?

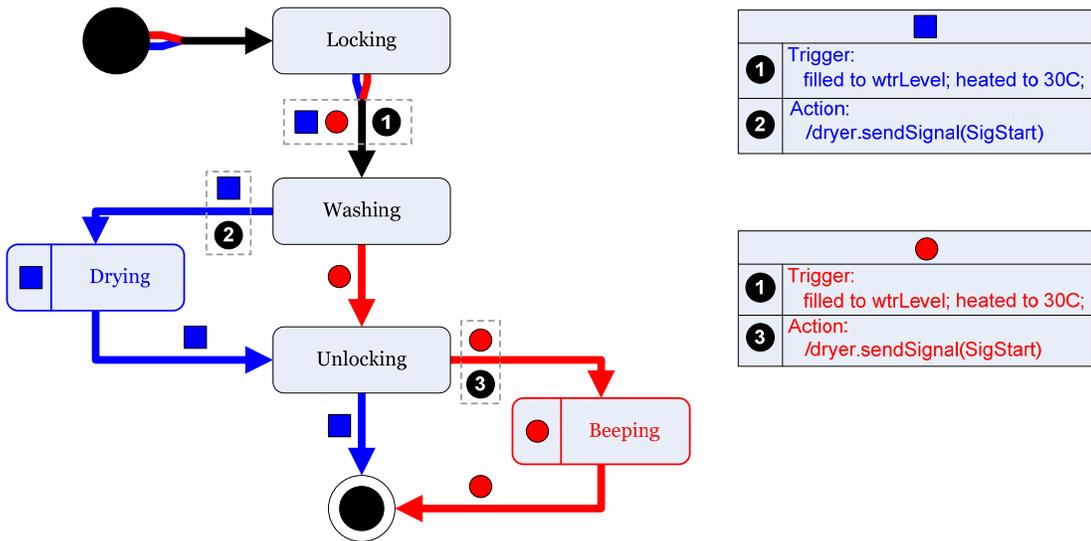
### Part 15c

What did you dislike about the other graph?

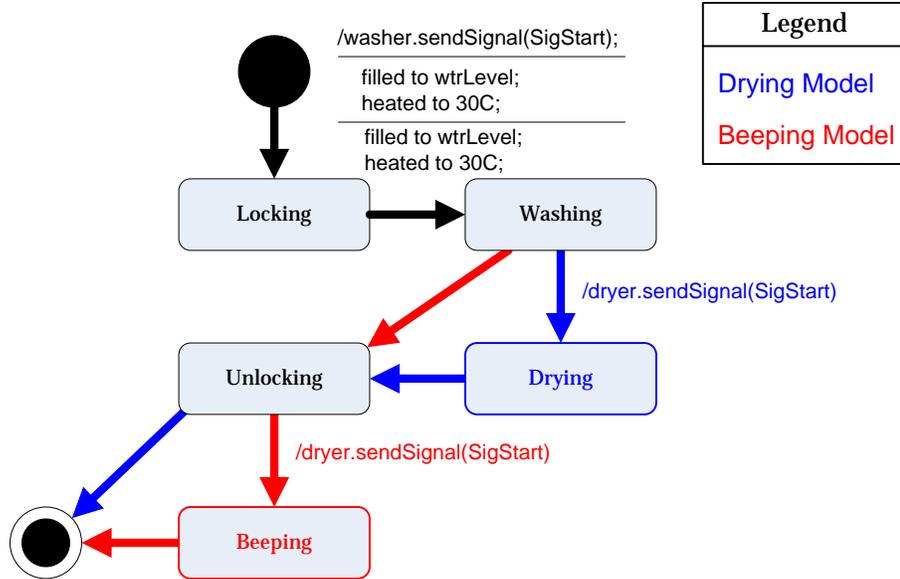
### Question 16

Consider the following graphs that show two different washing machine models. The **blue** model is a model that has a drying function; the **red** model is a model that has a beeping function

a.



b.



### Part 16a

Which graph displayed the different models clearest?

a

b

### Part 16b

What do you think made this graph the easiest to understand?

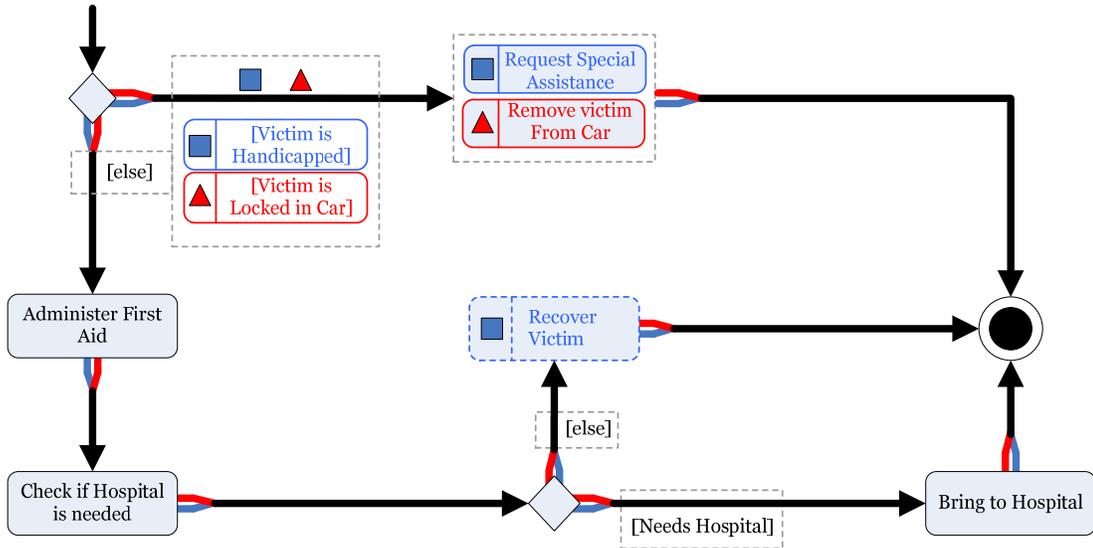
### Part 16c

What did you dislike about the other graph?

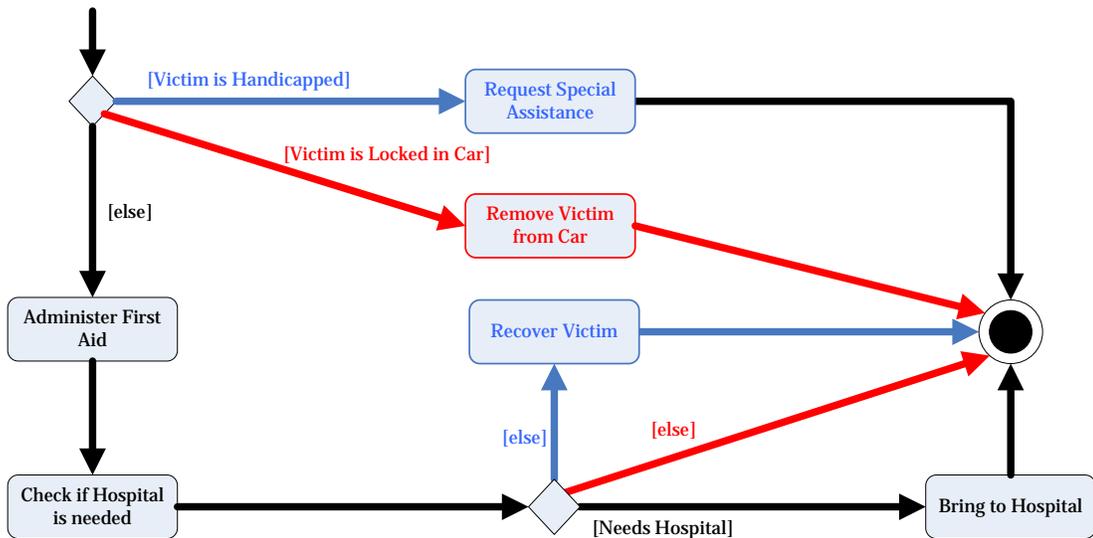
### Question 17

Consider the following graphs that show a scenario for a partial emergency response procedure. Each graph shows the same scenario. **Blue** is used for the case of a “Flood” situation; **Red** is used for the case of a “Car Crash” situation.

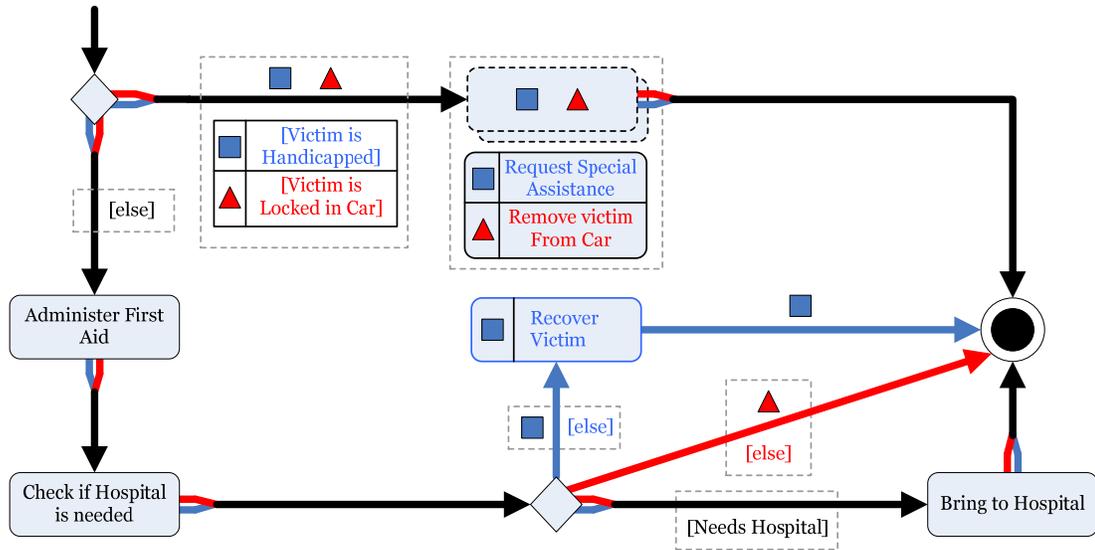
a.



b.



c.



### Part 17a

Which graph most clearly displayed the different scenarios?

a

b

c

### Part 17b

What do you think made this graph the easiest to understand?

### Part 17c

What did you dislike about the other graphs?

**Question 18**

Do you have any further thoughts about the concepts discussed in this survey?

**Thank you for taking the time to complete this questionnaire. Your assistance is much appreciated!**