

1. Complete the table below that lays out syntax and use rules for the if, elif, and else keywords.

Rule	Correct Example	Incorrect Example
A set of branches must begin with the if keyword	<code>if cond x == 5:</code>	<code>cond x == 5:</code>
Branches must use an expression that evaluates to the Boolean type	<code>if value > 2.4:</code>	<code>if value 2.4:</code>
Branches must end in a colon	<code>if boolean_var:</code>	<code>if boolean_var</code>
Print done after your branches to ensure operations will complete	<pre> if x == 5: x += 2 y = 'b' #print not in branch print('done') </pre>	<pre> if x == 5: #nothing in the branch print('done') </pre>
0 or more branches can start with elif, but only after an initial if branch	<pre> if val > 3: print('> 3') elif val > 2: print('> 2') elif val > 1: print('> 1') </pre>	<pre> elif val > 2: print('> 2') if val > 3: print('> 3') elif val > 1: print('> 1') </pre>
0 or 1 else branches can be used at the end of a series of branches	<pre> if y != 'test': print('not test') else: print('test') elif: print('won't work') </pre>	<pre> if y != 'test': print('not test') else: print('test') else: print("won't work") </pre>

2. Given the following code, which of the following are printed to the terminal? Feel free to run the code step by step through Python Tutor if you get stuck.
(Note: There may be multiple correct answers)

```
1 x = 100
2 y = 50
3 z = 5
4
5 if (x % z == 0):
6     print("Statement 1")
7 elif (x / y == 2):
8     print("Statement 2")
9 if (y * z >= x):
10    print("Statement 3")
11 elif (y * z != 250):
12    print("Statement 4")
13 else:
14    print("Statement 5")
```

A. Statement 1

B. Statement 2

C. Statement 3

D. Statement 4

E. Statement 5

3. Select the equality operator(s) that make(s) the statement true.

(a) $100 \underline{\quad} 100$

A. ☒ == B. <= C. >= D. < E. > F. !=

(b) $500 \underline{\quad} 600 / 2$

A. == B. <= C. >= D. < E. ☒ > F. !=

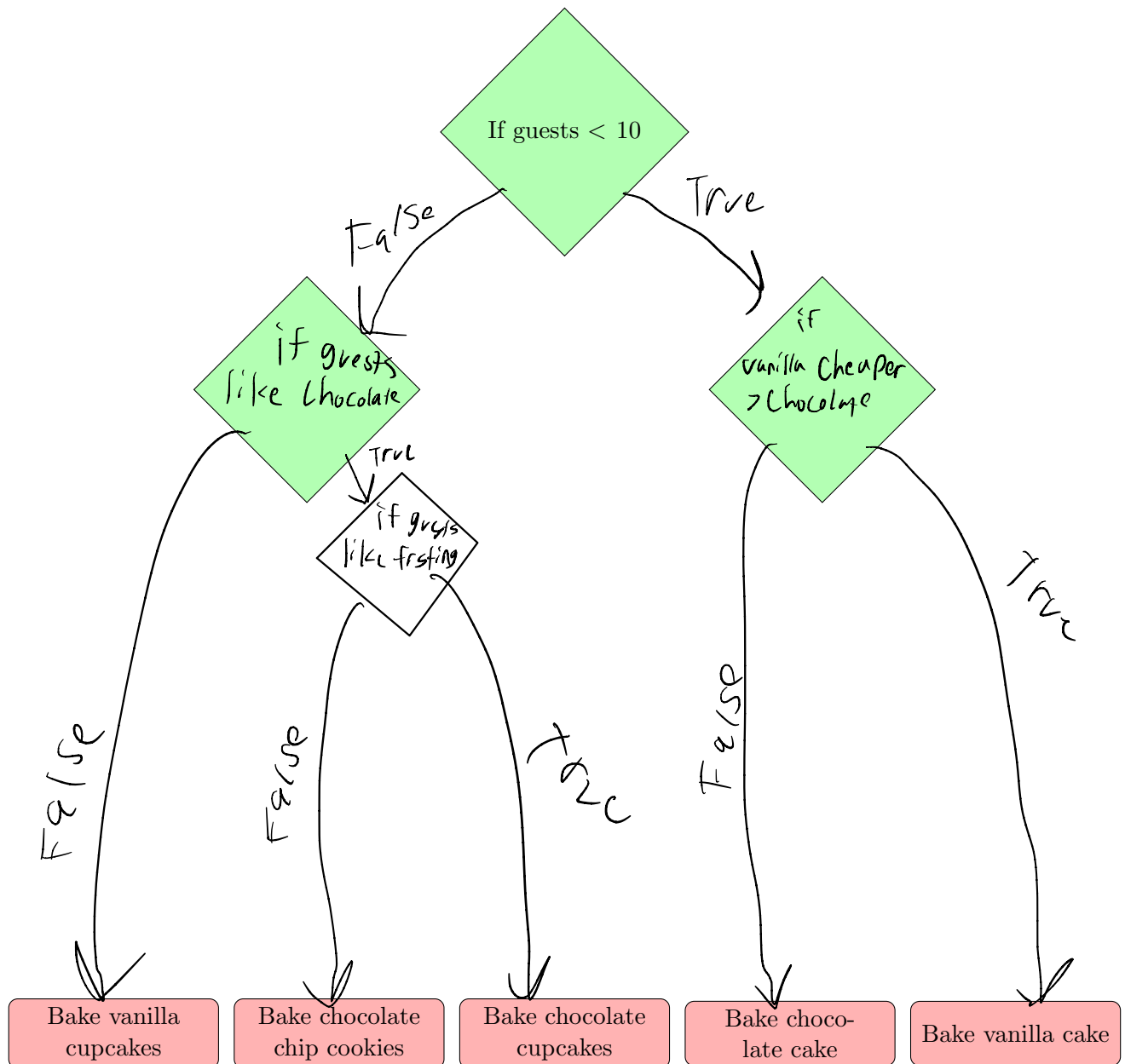
(c) $77 \% 10 \underline{\quad} 7.7$

A. == B. <= C. >= D. < E. > F. ☒ !=

4. Sketch out a flowchart using if else statements to describe the following scenario:

Stacy is trying to decide what to bake for a party, and is deciding between cake, cupcakes, and cookies. If there are less than 10 guests, she wants to make a cake. If so, she has to decide between vanilla and chocolate cake. If vanilla is cheaper than chocolate, she will make the vanilla cake. Otherwise, if there are more than 10 guests, she will make cupcakes or cookies. If the guests like chocolate, but don't like frosting, she will make chocolate chip cookies. If they like both chocolate and frosting, she will make chocolate cupcakes. If they don't like chocolate, she will make vanilla cupcakes.

The diagram has been started for you. Use diamonds for if statements. The rectangles represent the final results:



5. Given the following code:

```
1 x = int( input("Enter a number:") )
2 if(x > 10):
3     x = x + 100
4 else:
5     x = 1
6 if(x > 100):
7     x = 101
8 else:
9     x = x * 101
10
11 print(x, "Dalmatians")
```

(a) What is printed when $x = 10$, $x = 100$, and $x = 0$? Feel free to run the code step by step through Python Tutor if you get stuck.

10 - 101 Dalmatians

100 - 101 Dalmatians

0 - 101 Dalmatians

(b) Does there exist a value of x such that a different output is printed? Why or why not?

No because no matter what the last else will ensure x is set to 101.

6. Describe an example of your own where using if, elif, and/or else statements could be useful

When deciding clothes to wear

if (cold):
 wear cold clothes

else if (warm):
 wear warm clothes

else:
 wear moderate clothes

7. Idle Ivan was lounging by a river trying to figure out a way to increase the amount of coins C_i that he had in his pocket without doing a lot of work. A clever gnome appeared and made him a proposition: he would double the money in Ivan's pocket every time Ivan crossed the bridge, but in return he asked for a payment of P coins after each bridge crossing (and after doubling the money).
- (a) Given that $P = 8$ and Ivan accepted the proposition, the following occurred: He crossed the bridge for the first time, and his money doubled. He paid the gnome eight coins and crossed again. His money doubled again, and he again paid the gnome eight more coins. He crossed for a third time, and his money doubled yet again. However, he only had eight coins left and had to give them all to the gnome, thus leaving him broke. How many coins did Ivan start with C_i ? Hint: this is a great problem to apply the technique of working backwards from the end.
- (b) In the previous example, notice that $C_i < P$. This problem can be generalized into several cases with defined outcomes. What are these cases, and what is the result in each case?
- (c) Write pseudocode to solve this problem. Assume C_i and P are provided over standard input (stdin). Output the number of coins that Ivan will have assuming he crosses the bridge as many times as possible. Output "infinite" if he can cross the bridge forever and continue to gain more coins.