INSTRUCTIONS

- You have 10 minutes to complete this quiz.

- The exam is closed book, closed notes, closed computer, closed calculator.

- Mark your answers **on the exam itself**. We will *not* grade answers written on scratch paper.

- For multiple choice questions, fill in each option or choice completely.

  - ☐ means mark **all options** that apply
  - ◯ means mark a **single choice**

Last name	
First name	
Student ID number	
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Discussion Section	___ ___ ___
All the work on this exam is my own. **(please sign)**	

0. **Your thoughts?** Draw your favorite Halloween costume idea!

1. **Bubba Gump**

   Write the output displayed by the interactive Python interpreter when each expression below is evaluated.

   ```python
   class Tree:
       def __init__(self, label, branches=()):
           self.label = label
           self.branches = list(branches)

       def is_leaf(self):
           return not self.branches

       def __repr__(self):
           if self.is_leaf():
               return 'Tree(' + repr(self.label) + ')'
           return 'Tree(' + repr(self.label) + ', ' + repr(self.branches) + ')'

   forrest = Tree(1)
   gump = Tree(1, [forrest, forrest])
   forrest.label = 2
   forrest = Tree(forrest)

   >>> run = Tree(forrest, gump.branches)
   >>> run
   ```

   _____

   ```python
   >>> forrest.label = 1
   >>> run
   ```

   _____

2. **Seeing the Forest for the Trees**

   Implement `all_paths` which takes a `Tree` and returns a list of linked list paths from the root to each leaf.

   ```python
   def all_paths(t):                                    class Link:
       """                                                  empty = ()
       >>> t = Tree(1, [Tree(2), Tree(3)])                  def __init__(self, first, rest=empty):
       >>> all_paths(t)                                         self.first = first
       [Link(1, Link(2)), Link(1, Link(3))]                     self.rest = rest
       """

       if _____:

           return _____

       paths = []

       _____:

           paths += _____

       return paths
   ```