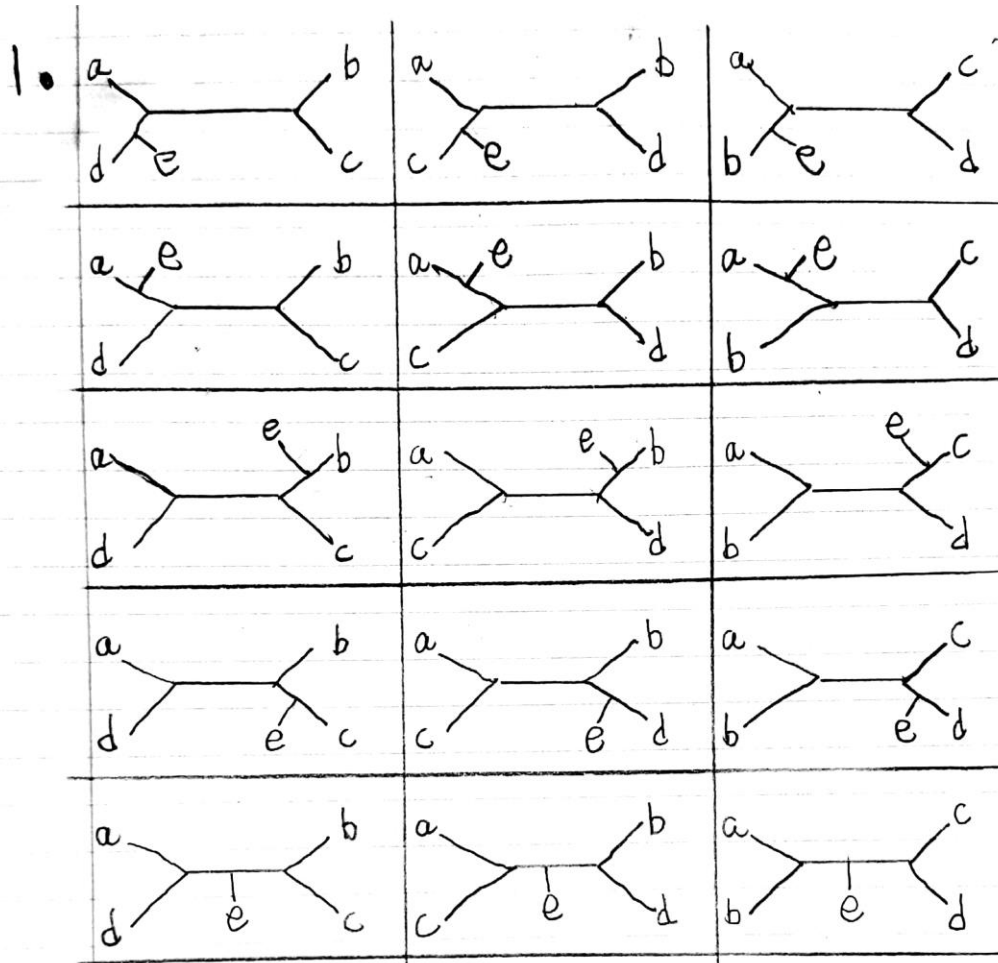


Sander VanWilligen – Homework 7 Report:

Problems 1 and 2:



2. a. $D(V_1)=3, D(V_2)=3, D(V_3)=1, D(V_4)=1, D(V_5)=1$
 $D(V_6)=1, D(V_7)=1, D(V_8)=1, D(V_9)=4$
- b. Leaves = $\{V_3, V_4, V_5, V_6, V_7, V_8\}$
- c. The tree is not binary. The maximum degree of a binary tree node is 3. The degree of V_9 is 4.
- d.
- ```

graph TD
 V9((V9)) --- V1((V1))
 V9 --- V5((V5))
 V9 --- V4((V4))
 V9 --- V3((V3))
 V1 --- V6((V6))
 V1 --- V2((V2))
 V2 --- V8((V8))
 V2 --- V7((V7))

```
- e.  $((V_5, V_4, V_3)V_9, V_6(V_8, V_7)V_2)V_1$

**Problem 3:**

When using the program on problem 2 part e, it does not produce the same result. The tree from problem 2 is an unrooted non-binary tree with internal and leaf nodes. The program produces a binary tree and treats all nodes as leaf nodes

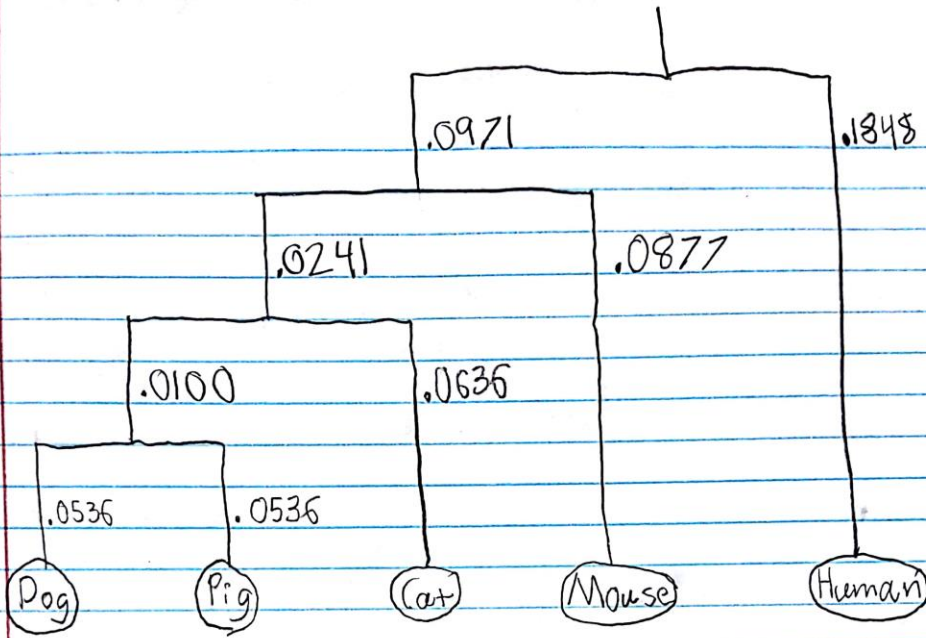
**Problem 4:**

|                                      |                |
|--------------------------------------|----------------|
| Distance between dog and cat is:     | 0.146808432845 |
| Distance between dog and mouse is:   | 0.146808432845 |
| Distance between dog and pig is:     | 0.107325632731 |
| Distance between dog and human is:   | 0.329524994838 |
| Distance between cat and mouse is:   | 0.232616196228 |
| Distance between cat and pig is:     | 0.107325632731 |
| Distance between cat and human is:   | 0.383119217824 |
| Distance between mouse and pig is:   | 0.146808432845 |
| Distance between mouse and human is: | 0.383119217824 |
| Distance between pig and human is:   | 0.383119217824 |

**Problems 5 and 6:**

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5.



6.  $L = L_1 \cdot L_2$

$$L_1 = [P(A)P(A \rightarrow A)P(A \rightarrow A)]$$

$$L_1 = \left[ \left( \frac{1}{4} \right) \left( \frac{1}{4} + \frac{3}{4} e^{-4 \times .13} \right)^2 \right]$$

$$L_2 = \left[ \left( \frac{1}{4} \right) \left( \frac{1}{4} + \frac{3}{4} e^{-4 \times .13} \right) \left( \frac{1}{4} - \frac{1}{4} e^{-4 \times .06} \right) \right]$$

$$L_1 = .11902$$

$$L_2 = .01009$$

$$L = .06120$$

1 2

L1 A A G

L2 B A C

L3 C A G