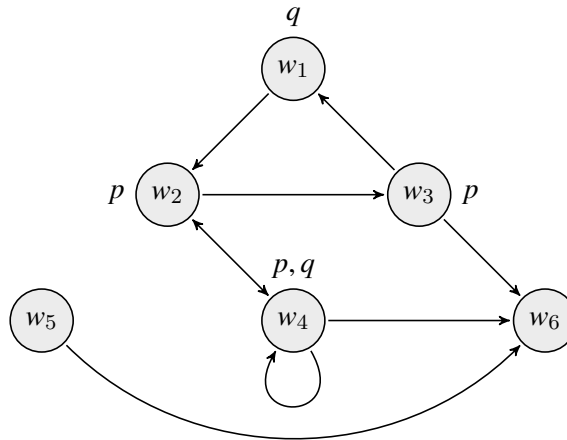


# Modal Truth & Bisimulations

## Phil 143 Worksheet

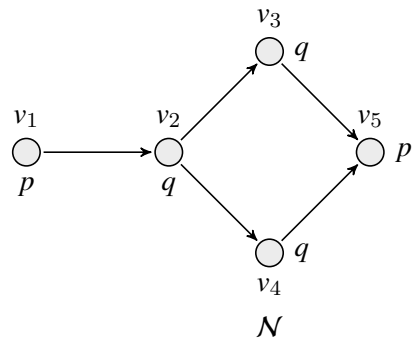
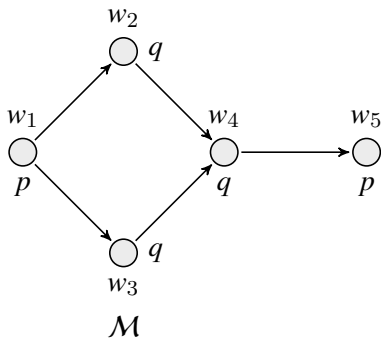
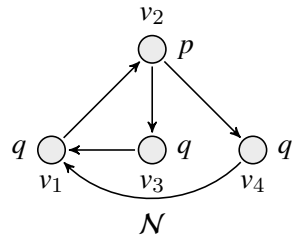
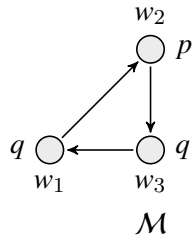
1. Consider the following diagram:



Which states are the following formulas true?

- |   |   |
|---|---|
| (a) $\diamond(p \wedge q)$              | (j) $\diamond p$                                |
| (b) $\diamond(p \wedge \neg q)$         | (k) $\diamond\diamond p$                        |
| (c) $\diamond\diamond(p \wedge q)$      | (l) $\Box\diamond p$                            |
| (d) $\Box\diamond(p \wedge \neg q)$     | (m) $\diamond\Box p$                            |
| (e) $\Box\perp$                         | (n) $\Box\Box p \rightarrow \Box p$             |
| (f) $\diamond\Box\perp$                 | (o) $\diamond\diamond p \rightarrow \diamond p$ |
| (g) $\diamond\diamond\diamond\Box\perp$ | (p) $\Box\diamond p \rightarrow \diamond p$     |
| (h) $\Box p$                            | (q) $\diamond\Box p \rightarrow \Box p$         |
| (i) $\Box\Box p$                        | (r) $\Box\diamond p \rightarrow \diamond\Box p$ |

2. Draw a bisimulation between the models  $\mathcal{M}$  and  $\mathcal{N}$  connecting  $w_1$  and  $v_1$ :



3. Find a formula that  $w_1$  and  $v_1$  disagree on in the models below:

