

# Identity

PHIL-205-01:Symbolic Logic

Blizzard MacDougall

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Example identity:

I see a President and no one else.  
 I see Joe Biden.  
 Therefore, Biden is President.

|                                                                         |                                 |
|-------------------------------------------------------------------------|---------------------------------|
| 1. $\forall x[(Px \wedge Six) \wedge \forall y(Siy \rightarrow y = x)]$ |                                 |
| 2. $Sib$                                                                |                                 |
| 3. $Pa \wedge Sia \wedge \forall y(Siy \rightarrow y = a)$              |                                 |
| 4. $\forall y(Siy \rightarrow y = a)$                                   | $\wedge$ <b>Elim:</b> 3         |
| 5. $Sib \rightarrow b = a$                                              | $\forall$ <b>Elim:</b> 4        |
| 6. $b = a$                                                              | $\rightarrow$ <b>Elim:</b> 5, 2 |
| 7. $Pa$                                                                 | $\wedge$ <b>Elim:</b> 3         |
| 8. $Pb$                                                                 | $=$ <b>Elim:</b> 6, 7           |
| 9. $\exists$ <b>Elim:</b> 1, 3 – 8                                      |                                 |

The F is a G. a is not a G. Therefore a is not an F.

|                                                                       |                                  |
|-----------------------------------------------------------------------|----------------------------------|
| 1. $\exists x \forall y (Fx \wedge (Fy \rightarrow x = y) \wedge Gx)$ |                                  |
| 2. $\neg Ga$                                                          |                                  |
| 3. $\forall y (Fb \wedge (Fy \rightarrow b = y) \wedge Gb)$           |                                  |
| 4. $Fb \wedge (Fa \rightarrow b = a) \wedge Gb$                       | $\forall$ <b>Elim:</b> 3         |
| 5. $Fa$                                                               |                                  |
| 6. $Fa \rightarrow b = a$                                             | $\wedge$ <b>Elim:</b> 4          |
| 7. $b = a$                                                            | $\rightarrow$ <b>Elim:</b> 6, 5  |
| 8. $Gb$                                                               | $\wedge$ <b>Elim:</b> 4          |
| 9. $Ga$                                                               | $=$ <b>Elim:</b> 7, 8            |
| 10. $\perp$                                                           | $\perp$ <b>Intro:</b> 9, 2       |
| 11. $\neg Fa$                                                         | $\neg$ <b>Intro:</b> 5-10        |
| 12. $\neg Fa$                                                         | $\exists$ <b>Elim:</b> 1, 3 – 11 |