Fall 2015

Predicate Logic Translation II Handout

1. All mice are purple. (Mx, Px) $(\forall x)(\mathbf{M}\mathbf{x} \supset \mathbf{P}\mathbf{x})$ 2. No mice are purple. $(\forall x)(Mx \supset \sim Px)$ 3. Some mice are purple. $(\exists x)(Mx \cdot Px)$ 4. Some mice are not purple. $(\exists x)(Mx \cdot \sim Px)$ 5. Snakes are reptiles. (Sx, Rx) $(\forall x)(Sx \supset Rx)$ 6. Snakes are not all poisonous. (Sx, Px) $\sim (\forall x)(Sx \supset Px) \text{ or } (\exists x)(Sx \cdot \sim Px)$ 7. Children are present. (Cx, Px) $(\exists x)(Cx \cdot Px)$ 8. Executives all have secretaries. (Ex, Sx) $(\forall x)(\mathbf{E}\mathbf{x} \supset \mathbf{S}\mathbf{x})$ 9. Only executives have secretaries. $(\forall x)(Sx \supset Ex)$ 10. All that glitters is not gold. (Gx, Ax) $\sim (\forall x)(Gx \supset Ax)$ 11. Nothing in the house escaped destruction. (Hx, Ex) $(\forall x)(Hx \supset \sim Ex)$ 12. Blessed is he that considers the poor. (Bx, Cx) $(\forall x)(Cx \supset Bx)$ 13. Some students are intelligent and hard working. (Sx, Ix, Hx) $(\exists x)[Sx \cdot (Ix \cdot Hx)]$ 14. He that hates dissembles with his lips, and lays up deceit within him. (Hx, Dx, Lx) $(\forall x)[Hx \supset (Dx \cdot Lx)]$

15. Everything enjoyable is either illegal, immoral, or fattening. (Ex, Lx, Mx, Fx)

 $(\forall x)\{Ex \supset [(\sim Lx \lor \sim Mx) \lor Fx]$

```
16. Some medicines are dangerous if taken in excessive amounts. (Mx, Dx, Tx)
(\exists x)[Mx \cdot (Tx \supset Dx)]
17. Some medicines are dangerous only if taken in excessive amounts.
(\exists x)[Mx \cdot (Dx \supset Tx)]
18. Victorian houses are attractive (Vx, Hx, Ax)
(\forall x)[(\mathbf{H}\mathbf{x}\cdot\mathbf{V}\mathbf{x})\supset\mathbf{A}\mathbf{x}]
19. Slow children are at play. (Sx, Cx, Px)
(\exists x)[(Cx \cdot Sx) \cdot Px]
20. Any horse that is gentle has been well-trained. (Hx, Gx, Wx)
(\forall x)[(Hx \cdot Gx) \supset Wx]
21. Only well-trained horses are gentle.
(\forall x)[(\mathbf{H}\mathbf{x}\cdot\mathbf{G}\mathbf{x})\supset\mathbf{W}\mathbf{x}]
22. Only gentle horses have been well-trained.
(\forall x)[(\mathbf{H}\mathbf{x}\cdot\mathbf{W}\mathbf{x})\supset\mathbf{G}\mathbf{x}]
23. A knowledgeable, inexpensive mechanic is hard to find. (Kx, Ex, Mx, Hx)
(\forall x)\{[(Kx \cdot \sim Ex) \cdot Mx] \supset Hx\}
24. Dogs and cats chase birds and squirrels. (Dx, Cx, Bx, Sx)
(\forall x)[(\mathbf{D} \mathbf{x} \vee \mathbf{C} \mathbf{x}) \supset (\mathbf{B} \mathbf{x} \cdot \mathbf{S} \mathbf{x})]
25. If all survivors are women, then some women are fortunate. (Sx, Wx, Fx)
(\forall x)(Sx \supset Wx) \supset (\exists x)(Wx \cdot Fx)
26. Some, but not all, of us got away. (Ux, Gx)
(\exists x)(Ux \cdot Gx) \cdot \sim (\forall x)(Ux \supset Gx)
27. If all ripe bananas are yellow, then some yellow things are ripe. (Rx, Bx, Yx)
(\forall x)[(Bx \cdot Rx) \supset Yx] \supset (\exists x)(Yx \cdot Rx)
28. If any employees are lazy and some positions have no future, then some employees will not be
successful. (Ex, Lx, Px, Fx, Sx)
[(\exists x)(Ex \cdot Lx) \cdot (\exists x)(Px \cdot \sim Fx)] \supset (\exists x)(Ex \cdot \sim Sx)
29. No coat is waterproof unless it has been specially treated. (Cx, Wx, Sx)
(\forall x)[Cx \supset (\sim Wx \lor Sx)]
                                              or
                                                          (\forall x)[Cx \supset (\sim Sx \supset \sim Wx)]
           (\forall x)[(\mathbf{C}\mathbf{x}\cdot\mathbf{W}\mathbf{x})\supset\mathbf{S}\mathbf{x}] or
                                                          \sim (\exists x)(Cx \cdot Wx \cdot \sim Sx)
```

30. A professor is a good lecturer if and only if she is both well-informed and entertaining. (Px, Gx, Wx,

 $(\forall x)\{Px \supset [Gx \equiv (Wx \cdot Ex)]\}$