Exercises in Existential Quantification
PHI 154 (Eliot)

Note: I'm using variables like x and y in the definitions of predicates to show how many places they have—whether they are one-place (e.g. Ox) or two-place (e.g. Oxy) or more. In actual PL sentences, you could never leave variables unbound like that.

UD = people
Fx = x is famous
Px = x is a professor
Tx = x has a television
Kxy = x knows who y is
j = the Vice President of the United States
k = Kim Kardashian
d = Doris who cooks at Bits & Bytes

Translate these from Predicate Logic into English using the provided key. Think about them literally first, and then think whether there is a more natural way to express them in English:

1. $Fk \wedge Fj$
2. $Tk \wedge Fk$
3. $\neg Pk \wedge Kkj$
4. $Kjk \rightarrow \neg Pk$
5. $Kkk \wedge \neg Kjj$
6. $\neg Fd \wedge \neg(Kjd \vee Kkd)$
7. $Kjk \leftrightarrow Tj$
8. $(\exists x)\neg Fx$
9. $\neg(\exists x)Fx$
10. $\neg(\exists y)\neg Ty$
11. $(\exists z)(Pz \wedge \neg Fz)$
12. $(\exists z)\neg(Pz \wedge Fz)$
13. $\neg(\exists z)(Pz \wedge Fz)$
14. $(\exists y)Fy \wedge (\exists x)Px$
15. $(\exists x)Kxj \rightarrow Kdj$
16. $(\exists x)\neg Kdx \wedge Kdk$
17. $(\exists x)(Px \wedge \neg Kxk)$
18. $(\exists x)(\neg Kxk \wedge Px)$
19. $\neg(\exists y)(Py \wedge (\neg Ty \wedge \neg Kyk))$
20. $\neg(\exists z)\neg(Pz \vee Tz)$
21. $[(\exists x)\neg Tx \rightarrow (\exists y)\neg Kyj] \wedge [(\exists y)\neg Kyj \rightarrow (\exists z)\neg Kzk]$
22. $\neg(\exists x)\neg Tx \rightarrow \neg(\exists y)(\neg Kyj \wedge \neg Kyk)$

23. $\neg(\exists x)\neg Kxj \vee [(\exists x)\neg Kxj \rightarrow \neg(\exists y)Ty]$
24. $(\exists y)[Py \wedge (Kyk \leftrightarrow Ty)]$
25. $(\exists y)[(Fy \wedge Py) \wedge [(Ty \vee \neg Ty) \rightarrow Kyk]]$
26. $(\exists z)(Kzd \wedge Kzk) \rightarrow (\exists y)(Py \wedge Ty)$

Translate from English into Predicate Logic:

1. Doris isn't famous, but Kim Kardashian is.
2. Kim Kardashian is famous, but she is not a famous professor.
3. Kim Kardashian is famous if and only if the Vice President is.
4. Though Doris isn't famous, someone is.
5. Someone is famous and they have a TV.
6. Kim Kardashian is famous only if someone has a TV.
7. Nobody is famous.
8. Somebody is not famous.
9. No one isn't famous.
10. Someone is neither famous nor a professor.
11. Someone is a non-famous professor only if someone is not famous.
12. There are no non-famous professors who own televisions.
13. Someone isn't a professor and isn't famous, but knows Kim Kardashian.
14. If Kim Kardashian doesn't know who she is, she doesn't have a TV or she's not famous.
15. If no one is famous and no one owns a TV, no one knows who Kim Kardashian is.
16. Someone who doesn't have a TV is a famous professor.
17. If there's a professor who doesn't have a TV, there's someone who doesn't know who Kim Kardashian is.
18. If the Vice President doesn't know who Doris is, then at least some professors do.
19. There are no professors who don't know who the Vice President is.
20. Some professors don't know who Kim Kardashian is just in case some professors neither have televisions nor know who the Vice President is.
21. If the Vice President knows who Kim Kardashian is, then there's nobody who doesn't know who Kim Kardashian is.
22. There's a famous professor who knows who both Kim Kardashian and the Vice President are if and only if there's a famous professor who has a television.