I. (a) \{<10>\} This is a one-place predicate.
(b) \{<0>,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>\} A one-place predicate.
(c) \{<0>,<2>,<4>,<6>,<8>,<10>\} A one-place predicate.
In words: everything divisible by \(y\) is even.
(d) \{<0,1>,<1,2>,<1,3>,<1,4>,<1,5>,<1,6>,<1,7>,<1,8>,<1,9>,<1,10>,
<2,3>,<2,5>,<2,7>,<2,9>,<3,4>,<3,5>,<3,7>,<3,8>,<3,10>,
<4,5>,<4,7>,<4,9>,<5,6>,<5,7>,<5,8>,<5,9>,<6,7>,<7,8>,<7,9>,
<7,10>,<8,9>,<9,10>\} A two-place predicate.
In words: \(y<z\), and \(y\) and \(z\) have no common factors other than 1.
(e) \{<2,4>,<2,8>,<3,9>,<4,8>\} A two-place predicate.
In words: \(y<z\), and \(y\) and \(z\) have exactly the same prime factors.

II. (a) F All Fs are Gs.
(b) T At least one H is not F.
(c) T \(a\) Ks something and something Ks \(a\).
(d) T Something both Ks \(a\) and is Ked by \(a\).
   or, Something and \(a\) K each other.
(e) T There’s a pair that K each other.
(f) T Every H either Ks or is Ked by something.
(g) F There’s a thing that Ks or is Ked by everything.
(h) F If a thing Ks a second then the second Ks it.
(i) T If a pair of things each Ks itself then if one Ks the other,
   the other Ks the one.
(j) F If a thing Ks a second that Ks a third, then the first also
   Ks the third.

III. (a) T Every odd NNI is smaller than at least one even NNI.
(b) F In any pair of distinct NNIs, the first divides the second.
(c) T If \(x+y=x+z\) then \(y=z\), where \(x\), \(y\), and \(z\) are any NNIs.
(d) F If one number divides a second then the second divides
   the first.
(e) T If a number divides a second that divides a third,
   then the first also divides the third.
(f) T The sum of any two NNIs is a NNI.
(g) F There’s a NNI such that it is the sum you get
   no matter what NNI you add to \(x\), where \(x\) is any NNI.
(h) T There’s a NNI such that the sum of it and a second NNI is
   that second NNI.
(i) T Every NNI is smaller than at least one prime.
(j) ? Every NNI is smaller than at least one pair of primes
   that differ by exactly 2 (twin primes).
IV.  (a) $\forall x \ [Sxt \to Ttx]$ All As are Bs  
(b) $\exists x \ [Sxt \land Txx]$ Some As are Bs  
(c) $\exists x \ [Sxt \land \exists y \ [Syd \land Tx]]$ Some As are Bs  
(d) $\forall x \ [Sxd \to \forall y \ [Syh \to Tx]]$ All As are Bs  
(e) $\forall x \ [Lxt \to Ltx]$ All As are Bs  
(f) $\forall x \ [Lxx \to Ltx]$ All As are Bs  
(g) $\exists x \ [Ltx \land \forall y \ [Lyt \to Lxy]]$ Some As are Bs  
(h) $\neg \exists x \ \forall y \ [Syt \to Lxy]$ No As are Bs  
(i) $\neg \exists x \ \forall y \ [Lxx \to \forall y \ [Lxy \to Lyx]]$ Not all As are Bs  
(j) $\exists x \ Sxt \land \exists x \ Sxd \land \neg \text{Std}$ P and Q, but not R

V.  (a) $\exists x \ \exists y \ [\neg x=y \land Gx \land Gy]$  
(b) $\neg \exists x \ \exists y \ [\neg x=y \land Bx \land By]$  
(c) $\exists x \ Bx \land \neg \exists x \ \exists y \ [\neg x=y \land Bx \land By]$  
(d) $\exists x \ \exists y \ [(\neg x=y \land Gx \land Gy) \land Dxy]$ There are at least 2 As that B.  
(e) $\exists x \ \exists y \ [\neg x=y \land (Gx \land \exists z \ Dxz) \land (Gy \land \exists z \ Dyz)]$ There are at least 2 As.  
(f) $\exists x \ \exists y \ [(\neg x=y \land Bx \land By \land Dxy) \land \neg \exists z_1 \ \exists z_2 \ [(\neg z_1=Z_2 \land Bz_1 \land Bz_2 \land Dz_1z_2) \land (\neg z_1=x \land \neg z_1=y) \lor (\neg z_2=x \land \neg z_2=y)]]$ Exactly 2 As are Bs  
(g) $\exists x \ \exists y \ [\neg x=y \land \forall z \ [Dxz \leftrightarrow Dyz]]$ At least 2 As are Bs  
(h) $\forall x \ [Bx \to (\exists y \ [Gy \land Dxy]) \land \neg \exists y \ [\neg y=z \land (Gy \land Dxy) \land (Gz \land Dxz)]]$ Every B D-d exactly 1 G, and $\land \exists x \ [Gx \land \exists y \ [\neg y=z \land (By \land Dxy) \land (Bz \land Dxz)]]$ At least 1 G D-d at least 2 BAs  
(i) $\forall x \ [\exists y \ Dxy \to \exists y \ [\neg y=z \land Dxy \land Dxz]]$ Every A D-d at least 2 things  
(j) $\neg \exists z \ [(Gz \land Dxz \land Dyz) \land \exists x \ \exists y \ [\neg x=y \land Bx \land By]]$ Not (at least 1 G D-d at least 2 Bs)