HW PARSING AND QUANTIFIER RULES IN $\mathscr{L}$3 (MONADIC PREDICATE LOGIC)

PARSING EXERCISE

For each of the following formulas,
Say which of these three apply to it:
* formal notation
* informal notation
* not well-formed

1. ∃xFx → Gx Not well formed
2. ∃x(Fx → Gx) Formal
3. ∀a(Fa → ~Ga) Formal
4. ~(~∀x~Fx v Gy) Not well formed
5. ∃x(P ↔ Q ∧ R) Formal
6. (Fa → ~GK) Not well formed
7. (Fxy → Gyx) Not well formed
8. ∀a(Hx ↔ Gy) Not well formed
9. ∃∀x(Hx ↔ Gx) Not well formed
10. ∃x∀y∃z(~Fx ∧ Gy → ~Fz) Formal
11. ∀y~∃~x(Hx ∧ Gy) Not well formed
12. ∀y(Hy → ∃xHx) Formal
13. ~∃x~∃y~(~∀x~∀y → ∃z~Fz) Not well formed
14. ∀x(∀x(Hx → ~∃y~Gy) v Fx) Not well formed
15. (∃x)~Fx Not well formed
16. ~∀x~∃y(Fx ∧ ~Gy) Formal
17. ~∀x~∃yFx ∧ ~Gy Not well formed
18. ∀x(FGx → Gy) Not well formed
19. ∃xFx ∧ ∃xGx → ∃x(Fx ∧ Gx) Informal
20. ~∃x~Fx ∧ ((Fa → ∃y~Hy) ↔ ∃z(~Fz → Hz)) Informal

QUANTIFIER RULES EXERCISE

All the basic rules of propositional (aka sentential) logic are basic rules of predicate logic. There are three more basic rules (as defined in Parsons 3: 6), UI (universal generalization), EG (existential generalization), and EI (existential instantiation).

For each argument below, say which rule was used (if any) and NONE if no rule justifies the inference.

1. $\exists xFx \;\therefore\; Fi$ EI
2. $Gx \;\therefore\; \forall xGx$ None
3. $\exists yGy \;\therefore\; Ga$ None
4. $\forall xGy \;\therefore\; Gy$ None
5. $\exists xGy \;\therefore\; Gi$ None
6. $\forall x\exists y(Fx \rightarrow Gy \vee Hx) \;\therefore\; \exists y(Fa \rightarrow Gy \vee Ha)$ UI
7. $\exists x\forall y(Fy \rightarrow Gx) \;\therefore\; \forall y(Fy \rightarrow Gj)$ EI
8. $Fa \rightarrow Ga \;\therefore\; \exists y(Fa \rightarrow Gy)$ None
9. $\exists xGy \;\therefore\; Gy$ None
10. $Fa \rightarrow Ga \;\therefore\; \exists y(Fy \rightarrow Gy)$ EG
11. $\sim\forall x\exists y(Fz \leftrightarrow Gy) \;\therefore\; \exists z\sim\exists y(Fz \leftrightarrow Gy)$ None
12. $\forall x\exists y(Fx \rightarrow Gy) \;\therefore\; \exists y(Fy \rightarrow Gy)$ None
13. $\forall x(\exists z(Fx \wedge Gy) \rightarrow \exists xHx \vee Gx) \;\therefore\; \exists z(Fa \wedge Gy) \rightarrow \exists xHx \vee Gx$ None
14. $\exists x(Fx \wedge Gy) \;\therefore\; Fi \wedge Gy$ EI
15. $Fa \wedge \exists x(Gx \vee Ga) \;\therefore\; \exists x(Fx \wedge \exists x(Gx \vee Gx))$ EG
16. $Fa \wedge \exists x(Gx \vee Ga) \;\therefore\; \exists y(Fy \wedge \exists x(Gx \vee Gy))$ EG
17. $(\forall xFx \rightarrow \exists y(Hy \vee Hx)) \;\therefore\; Fb \rightarrow \exists y(Hy \vee Hb)$ None
18. $\forall x(Fx \rightarrow \exists y(Fb \wedge Gy)) \;\therefore\; \exists z(\forall xFx \rightarrow \exists y(Fz \wedge Gy))$ EG
19. $\exists z(Fa \wedge Gz) \rightarrow \exists xHx \vee Ga \;\therefore\; \exists x(\exists z(Fa \wedge Gz) \rightarrow \exists xHx \vee Gx)$ EG
20. $\exists z(Fa \wedge Gy) \rightarrow \exists xHx \vee Ga \;\therefore\; \exists x(\exists z(Fx \wedge Gy) \rightarrow \exists xHx \vee Gx)$ EG