10.1

a. $K(a) \wedge W(m)$

b. $K(a) \rightarrow Q(g)$

c. $K(a) \wedge P(a, e)$

d. $\neg A(m, l)$

e. $L(l, g) \vee L(g, l)$

10.2

a. $(\forall x)\big(D(x) \rightarrow H(l, x)\big)$

b. $(\forall x)\big(D(x) \rightarrow N(x, l)\big)$

c. Interpret the sentence as “Not every dragon was keen on Merlin”,
that is to say, there exists one or more dragon that was not keen on Merlin,

thus, we have $(\exists x)\big(D(x) \wedge \neg K(d, m)\big)$,

or $\neg(\forall x)\big(D(x) \rightarrow K(d, m)\big)$, which is basically the same thing.

d. $\neg(\forall x)\big(P(x) \rightarrow S(x, h)\big)$, or $(\exists x)\big(P(x) \wedge \neg S(x, h)\big)$

* I read the textbook and saw the different “restricted quantification” and the standard format, I am not sure which format should I use here, I hope the standard one will do.

10.3

a. true, for <Gawaine, Igraine> is in $F_3(L)$

b. false, for <dragon, Lancelot> is not in $F_3(C)$

c. false, for <Elaine> is in $F_3(M)$ while <Elaine, Gawaine> is not in $F_3(L)$

d. true, for <Igraine> is in $F_3(M)$ and <Igraine, Gawaine> is in $F_3(L)$

e. true, <Lancelot, dragon> is in $F_3(S)$, so S(l, d) is true,

there exists no pair like <_, Elaine> in $F_3(L)$, so $\neg\big(\exists x{:}\, K(x)\big)\, L(x, e)$ is true

f. true, there is only one <dragon> in $F_3(D)$, and <Lancelot, dragon> is in $F_3(S)$,

so $\big(\forall x{:}\, D(x)\big)\, S(l, x)$ is true, for both <Elaine> and <Igraine> in $F_3(M)$,

<Lancelot, _> is in $F_3(F)$, so $\big(\forall y{:}\, M(y)\big)\, F(l, y)$ is true

10.4

a. $F(l, e) \vee F(l, i) = true \vee true = true$

b. $F(l, e) \veebar F(l, i) = true \veebar \text{true} = \text{false}$

c. $S(l, d) \rightarrow F(l, e) = true \rightarrow true = true$

d. $L(g, i) \rightarrow F(g, i) = true \rightarrow false = false$