Problem 1

Rules of inferences (1) is modulus tollens, (2) is disjunctive syllogism, (3) is addition, (4) is modus ponens

$$\begin{aligned} \neg(B \wedge C) \\ A \rightarrow (B \wedge C) \\ \neg A (1) \end{aligned}$$

$$\begin{aligned} A \vee D \\ D (2) \\ B \wedge D (3) \end{aligned}$$

$$\begin{aligned} (B \vee D) \rightarrow E \\ E (4) \end{aligned}$$

Problem 2

School Domain

a.

A(Lois, Professor Michaels)

b.

$\forall x(S(x) \rightarrow A(x,$Professor Gross$))$

c.

$\exists x(S(x) \wedge \forall y(F(y) \rightarrow \neg(A, x, y)))$

d.

$\exists x(F(x) \wedge \forall y(S(y) \rightarrow \neg A(y, x)))$

e.

$\forall y(F(y) \rightarrow \exists x(S(x) \wedge A(x, y)))$

f.

$\exists x(S(x) \wedge \forall y(F(y) \rightarrow \neg A(y, x)))$

Problem 3

True//False

a. True
b. False
c. True
d. True
e. False
f. False
g. False