1.1 EXERCISES

1.1.1. Which of the following is a statement?

(a) $2^{300} > 3^{200}$.

(b) The solutions to $x^3 - 3x^2 + 4x - 6 = 0$ are difficult to find.

(c) $4198 + 7432$.

(d) $853 = (56)15 + 13$.

(e) There is a prime integer larger than $10^{10^{10}}$.

1.1.2. In each of (a) – (i) determine the value(s) of a and/or b for which the statement is true.

(a) $3 < 2$ and $b = 6$.

(b) $a = 4$ or $2 < 3$.

(c) $a = 4$ or $3 < 2$.

(d) If $a = 4$ then $2 < 3$.

(e) If $a = 4$ then $3 < 2$.

(f) If $2 < 3$ then $b = 6$.

(g) If $3 < 2$ then $b = 6$.

(h) $a = 4$ if and only if $2 < 3$.

(i) $3 < 2$ if and only if $b = 6$.

1.1.3. Identify the hypothesis and conclusion in each of the following implications.

(a) 4 is an even integer only if 3 is prime.

(b) For 4 to be even it is sufficient that 3 be prime.

(c) For 3 to be prime it is necessary that 4 be even.

(d) For 4 to be even, 3 must be prime.

(e) 4 is even when 3 is prime.

(f) 3 is prime if 4 is even.

1.1.4. Write the converse and contrapositive of each of the following.

(a) If $3 \leq \sqrt{17}$ then $\sqrt{7} > 2.5$.

(b) If $3 \leq \sqrt{17}$ then $\sqrt{7} \neq 2.5$.

(c) If $5 > \sqrt{17}$ then $\sqrt{7} = 2.5$.