

3.4: PROVE OR DISPROVE

(a) $f(n) = O(g(n))$ implies $g(n) = O(f(n))$

FALSE: O -function is not symmetric

counter-example:

$$f(n) = n$$

$$\& g(n) = n^2$$

$$\therefore f(n) = O(g(n))$$

$$\text{i.e. } n = O(n^2)$$

but

$$\underline{\underline{n^2 \neq O(n)}}.$$

Q.E.D.

(b) $f(n) + g(n) = \Theta(\min(f(n), g(n)))$

FALSE:

counter-example:

$$\text{let, } f(n) = n \quad \& \quad g(n) = n^2.$$

$$n + n^2 = \Theta(\min(n, n^2))$$

$$\underline{\underline{n + n^2 = \Theta(n)}}$$

not true.

Q.E.D.