

HW 2-3, 5, 6, 8, 14, 19, 20, 62

$$\textcircled{3} \quad (x^2+1)/(x+1) = O(x)$$

$$\frac{x^2+1}{x+1} = \frac{x^2}{x} = x$$

$$\textcircled{6} \quad (x^3+2x)/(2x+1) = O(x^2)$$

$$\frac{(x^3+2x)}{(2x+1)} = \frac{x^3}{2x} + \frac{2x}{2x} = \frac{x^2+1}{2} = x^2$$

$$\textcircled{8} \quad D(c^n)$$

$$\textcircled{a}) \quad f(x) = 2x^2 + x^3 \log x$$

$\frac{x^5}{x^4} \downarrow x^2$   
 $x^4$

$$\textcircled{b}) \quad \frac{(x^3+5\log x)}{x^4+1} = \frac{x^3}{x^4} + \frac{5\log x}{x^4}$$

$$\textcircled{b}) \quad 3x^5 + \log(x)^4$$

$x^5 \log(x)^4$   
 $x^5$

(14)  $\textcircled{a})$  False

$$\textcircled{c}) \quad (x^4+x^2+1)/(x^4+1)$$

$$\frac{x^4+x^2+1}{x^4+1}$$

$$\frac{x^4}{x^4} + \frac{x^2}{x^4} = x^{\frac{1}{2}}$$

$\textcircled{b})$  True

$\textcircled{c})$  True

$\textcircled{d})$  False

$\textcircled{e})$  False

$\textcircled{f})$  True

$$(62) \log(n!) = O(n \log n)$$

$$Q) a) (n^2 + 8)(n+1)$$

$$n^3 + n^2 + 8n + 8$$

$$N^3 = O(n)$$

$$b) (n \log n + n^2)(n^3 + 2)$$

$$n^4 \log n + 2n \log n + n^6 + 2n^2$$

$$n^4 \log n$$

$$c) (n! + n^2)(n^3 + \log(n^2 + 1))$$

$$n!$$

$$Q) a) (n^3 + n^2 \log n)(\log n + 1) + (\log n + 1)(n^3 + 2)$$

$$n^5 \log^2 n$$

$$b) (2^n + n^2)(n^5 + 3^n)$$
$$\cdot 2^n \cdot 3^n$$

$$c) (n^n + n^2 + 5^n)(n! + 5^n)$$

$$n! n^n$$