

$$a) n^{\frac{5}{3}} = (2^{\lg n})^{\frac{5}{3}} = 2^{\lfloor \frac{5}{3} \lg n \rfloor}$$

$$b) 2^{\sqrt{\lg n}} = 2^{\lfloor \sqrt{\lg n} \rfloor}$$

$$c) \sqrt{n^n} = ((2^{\lg n})^n)^{\frac{1}{2}} = 2^{\lfloor \frac{1}{2} \cdot n \cdot \lg n \rfloor}$$

$$d) \frac{n^2}{\lg n} = \frac{2^{2 \cdot \lg n}}{\lg n} = \frac{2^{2 \cdot \lg n}}{2^{\lg n}} = 2^{\lfloor 2 \lg n - \lg n \rfloor}$$

$$e) 2^n = 2^{\lfloor n \rfloor}$$

$$f) \frac{2^2}{\sqrt{\lg n}} \quad d < f$$

$$\boxed{b < a < d < e < c}$$

$$(2^a)^b = 2^{a \cdot b}$$

$$2^a \cdot 2^b = 2^{a+b}$$

$$\frac{2^a}{2^b} = 2^{a-b}$$

$$\frac{2^{2n}}{2^n}$$

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

$$\frac{2^{n^2+n}}{2^{n^2}}$$

$$\frac{2^2}{\sqrt{\lg n}} < \sqrt{n} < \lg n$$