3. $n^2 = O(n^3)$ **1 / 1 point**

- (•) Yes
- ( ) No

✓ **Correct**
n^a grows slower than n^b for constants $a < b$.

4. $n = O(\sqrt{n})$ **1 / 1 point**

- ( ) Yes
- (•) No

✓ **Correct**
$\sqrt{n} = n^{1/2}$ grows slower than $n = n^1$ as $1/2 < 1$.

5. $5^{\log_2 n} = O(n^2)$ **1 / 1 point**

5. $5^{\log_2 n} = O(n^2)$ **1 / 1 point**

- Yes
- (•) No

✓ **Correct**
Recall that $a^{\log_b c} = c^{\log_b a}$ so $5^{\log_2 n} = n^{\log_2 5}$. This grows faster than n^2 since $\log_2 5 = 2.321\ldots > 2$.

6. $n^5 = O(2^{3\log_2 n})$ **1 / 1 point**

- Yes
- (•) No

✓ **Correct**
$2^{3\log_2 n} = (2^{\log_2 n})^3 = n^3$ and n^3 grows slower than n^5.

7. $2^n = O(2^{n+1})$ **1 / 1 point**

- (•) Yes
- No

TOTAL POINTS 2

1. Order the given functions by increasing growth rate. **1 / 1 point**

$f_1(n) = n^3$

$f_2(n) = n^{0.3}$

$f_3(n) = n$

$f_4(n) = \sqrt{n}$

$f_5(n) = \frac{n^2}{\sqrt{n}}$

$f_6(n) = n^2$

As an answer, provide a string of length exactly six (with no spaces or quotes) containing the numbers of six functions (the first number indicates the function with the smallest growth rate, while the last number indicates the function with the largest growth rate). For example, for a similar, but simpler problem $f_1(n) = n^2$, $f_2(n) = n$, $f_3(n) = n^3$ the answer would be 213.

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Is it true that $(\log_5 n)^2 = 2 \log_5 n$?

- Yes
- No (selected)

✓ **Correct**
$(\log_5 n)^2$ is just $(\log_5 n)(\log_5 n)$

2. $\log_2 n \cdot \log_3 2 = \log_3 n$ **1 / 1 point**

- Yes (selected)
- No

✓ **Correct**

3. $n^{\log_2 n} = n$ **1 / 1 point**

3. $n^{\log_2 n} = n$ **1 / 1 point**

- Yes
- (•) No

✓ **Correct**

4. $\log_3(2n) = \log_3 2 \cdot \log_3 n$ **1 / 1 point**

- Yes
- (•) No

✓ **Correct**

5. $\log_{10}(n^2) = 2\log_{10} n$ **1 / 1 point**

Correct

5. $\log_{10}(n^2) = 2\log_{10} n$ — 1 / 1 point

- (•) Yes
- ( ) No

Correct

6. $n^{\log_7 3} = 7^{\log_3 n}$ — 1 / 1 point

- ( ) Yes
- (•) No

Correct

$n^{\log_7 3} = 3^{\log_7 n}$

Is it true that $\log_2 n = O(n^2)$?

- (•) Yes
- ( ) No

✓ **Correct**
A logarithmic function grows slower than a polynomial function.

2. $n \log_2 n = O(n)$ **1 / 1 point**

- ( ) Yes
- (•) No

✓ **Correct**
To compare these two functions, one first cancels n. What is left is $\log_2 n$ versus 1. Clearly, $\log_2 n$ grows faster than 1.

3. $n^2 = O(n^3)$ **1 / 1 point**