

Which Function Grows Faster?

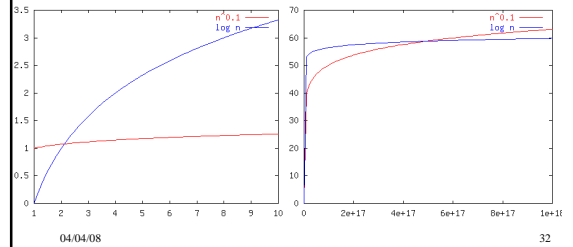
$n^{0.1}$ vs. $\log n$

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Which Function Grows Faster?

$n^{0.1}$ vs. $\log n$



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Which Function Grows Faster?

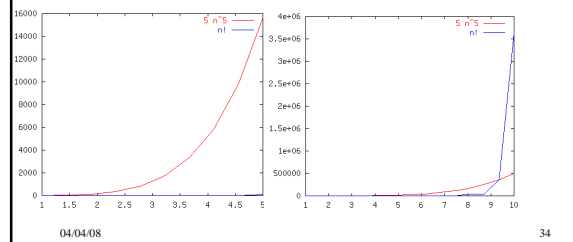
$5n^5$ vs. $n!$

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Which Function Grows Faster?

$5n^5$ vs. $n!$



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Nested Loops

```
for i = 1 to n do
  for j = 1 to n do
    sum = sum + 1
for i = 1 to n do
  for j = 1 to n do
    sum = sum + 1
```

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Nested Loops

```
for i = 1 to n do
  for j = 1 to n do
    if (cond) {
      do_stuff(sum)
    } else {
      for k = 1 to n*n
        sum += 1
```

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$$16n^3 \log_8(10n^2) + 100n^2 = O(n^3 \log(n))$$

- Eliminate low order terms
- Eliminate constant coefficients

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$$16n^3 \log_8(10n^2) + 100n^2 = O(n^3 \log(n))$$

- Eliminate low order terms $16n^3 \log_8(10n^2) + 100n^2$
 $\Rightarrow 16n^3 \log_8(10n^2)$
- Eliminate constant coefficients $\Rightarrow n^3 \log_8(10n^2)$
 $\Rightarrow n^3 [\log_8(10) + \log_8(n^2)]$
 $\Rightarrow n^3 \log_8(10) + n^3 \log_8(n^2)$
 $\Rightarrow n^3 \log_8(n^2)$
 $\Rightarrow n^3 2 \log_8(n)$
 $\Rightarrow n^3 \log_8(n)$
 $\Rightarrow n^3 \log_8(2) \log(n)$
 $\Rightarrow n^3 \log(n)$

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