	True	False
$\log(n!) = O\left(\log n^2\right)$	○	◉ ✔
$n^{2/3} + n^3 = O\left(n^2\right)$	○	◉ ✔
$5^5 + n \cdot \log n = O\left(n^{2/3}\right)$	○	◉ ✔
$5 \cdot 2^{2 \log n} = O\left((\log n)^3\right)$	○	◉ ✔
$\log n = O(n \cdot \log n)$	◉ ✔	○
$(\log n)^3 + 2^{\log n} = O\left(n^{0.01}\right)$	○	◉ ✔
$n! = O(\sqrt{n})$	○	◉ ✔
$n^{0.001} = O(1)$	○	◉ ✔
$3^n = O\left(2^{3 \log n}\right)$	○	◉ ✔
$n^2 = \Theta\left(2^{2 \log n}\right)$	◉ ✔	○
$\sqrt{n} = \Theta(n \cdot \log n)$	○	◉ ✔
$n^2 = \Theta\left(n^{0.1}\right)$	○	◉ ✔

	True	False
$2^{\log n} + 5n^n = O(\sqrt{n} \cdot \log n)$	○	◉ ✔
$n^2 \log n = O(\sqrt{n})$	○	◉ ✔
$\sqrt{n} \cdot \log n = O(n \cdot \log n)$	◉ ✔	○
$4n^2 = O\left(n^{0.1}\right)$	○	◉ ✔
$n^2 = O\left(\log n^2\right)$	○	◉ ✔
$2^n = O(n \cdot \log n)$	○	◉ ✔
$n = O(\log n)$	○	◉ ✔
$2^{3 \log n} = O(n \cdot \log n)$	○	◉ ✔
$5 = O(n \cdot \log n)$	◉ ✔	○
$n^{0.01} = \Theta(\sqrt{n})$	○	◉ ✔
$\log n^2 = O\left(\sqrt{n}\right)$	◉ ✔	○
$n^2 = O\left(2^{\log n}\right)$	○	◉ ✔

	True	False
$n^2 \log n = O\left(3^3\right)$	○	◉ ✔
$\log n^2 = O(1)$	○	◉ ✔
$6\sqrt{n} = O(n\sqrt{n})$	◉ ✔	○
$\sqrt{n} + \sqrt{n} = O(n \cdot \log n)$	◉ ✔	○
$n \cdot \log n = O\left((\log n)^3\right)$	○	◉ ✔
$2^n = O(\sqrt{n} \cdot \log n)$	○	◉ ✔
$n\sqrt{n} = O\left(n^{3/2}\right)$	◉ ✔	○
$8^{\log n} = O\left(n^{2/3}\right)$	○	◉ ✔
$n \cdot \log n = O\left((\log n)^2\right)$	○	◉ ✔
$n^n = O\left(3^n\right)$	○	◉ ✔
$7n \cdot \log n = \Theta(\log(n!))$	◉ ✔	○
$\sum_{i=1}^{n} i = O(\sqrt{n} \cdot \log n)$	○	◉ ✔

	True	False
$n \log n = O(1)$	○	◉ ✔
$n^{0.001} = O(\log n)$	○	◉ ✔
$n \cdot \log n = O(\log n)$	○	◉ ✔
$n \cdot \log n = O\left(5^5\right)$	○	◉ ✔
$\log n + 5n \cdot \log n = O\left(n^3\right)$	◉ ✔	○
$\log n = O\left(n^2\right)$	◉ ✔	○
$n^{0.1} = O(\log n)$	○	◉ ✔
$6n^3 = O(\sqrt{n})$	○	◉ ✔
$(\log n)^3 = O\left(8^{\log n}\right)$	◉ ✔	○
$n^{2/3} \cdot n^{1/3} = \Theta\left(n^2\right)$	○	◉ ✔
$n = \Theta\left(n^{2/3} \cdot n^{1/3}\right)$	◉ ✔	○
$n \cdot \log n = \Theta\left(7n \cdot \log\left(n^2\right)\right)$	◉ ✔	○

Algorithm loop1(n)
$s = 0$
for $i = 1$ **to** n
  for $j = 1$ **to** $i * i$
    $s = s + 1$

Algorithm loop2(n)
$s = 1$
for $i = 1$ **to** n
  for $j = 1$ **to** n
    $s = s + 1$

Algorithm loop3(n)
$i = 0$
$s = 0$
while $s \leq n$
  $i = i + 1$
  $s = s + i$

Algorithm loop4(n)
for $i = 0$ **to** n
  $j = 0$
  $s = 0$
  while $s \leq i$
    $j = j + 1$
    $s = s + j$

For each of the above algorithms, state its execution time as a function of n in Θ-notation.

	$\Theta\left(n^3\right)$	$\Theta\left((\log n)^2\right)$	$\Theta(\sqrt{n})$	$\Theta\left(n^2\right)$	$\Theta(n \log n)$	$\Theta(n\sqrt{n})$	$\Theta(\log n)$	$\Theta(n)$
loop1	◉ ✔	○	○	○	○	○	○	○
loop4	○	○	○	○	○	◉ ✔	○	○
loop2	○	○	○	◉ ✔	○	○	○	○
loop3	○	○	◉ ✔	○	○	○	○	○

Algorithm loop1(n)
```
s = 1
for i = n to 1 step −1
    s = s + 1
```

Algorithm loop2(n)
```
for i = 1 to n
    j = i
    while j > 0
        j = j − 1
```

Algorithm loop3(n)
```
s = 0
i = n
while i > 0
    for j = 1 to i
        s = s + 1
    i = i − 1
```

Algorithm loop4(n)
```
i = 0
j = 0
while i ≤ n
    if i < j then
        i = i + 1
    else
        j = j + 1
        i = 0
```

For each of the above algorithms, state its execution time as a function of n in Θ-notation.

	$\Theta\left(n^3\right)$	$\Theta\left((\log n)^2\right)$	$\Theta(\sqrt{n})$	$\Theta\left(n^2\right)$	$\Theta(n \log n)$	$\Theta(n\sqrt{n})$	$\Theta(\log n)$	$\Theta(n)$
loop3	○	○	○	◉ ✔	○	○	○	○
loop2	○	○	○	◉ ✔	○	○	○	○
loop4	○	○	○	◉ ✔	○	○	○	○
loop1	○	○	○	○	○	○	○	◉ ✔

More

Algorithm loop1(n)
  $s = 1$
  for $i = 1$ **to** n
    $s = s + 1$

Algorithm loop2(n)
  $i = 1$
  while $i \leq n$
    $i = 2 * i$

Algorithm loop3(n)
  $i = 1$
  while $i * i \leq n$
    $i = i + i$

Algorithm loop4(n)
  $i = 1$
  while $i \leq n$
    $j = 0$
    while $j \leq i$
      $j = j + 1$
    $i = 2 * i$

For each of the above algorithms, state its execution time as a function of n in Θ-notation.

	$\Theta\left(n^3\right)$	$\Theta\left((\log n)^2\right)$	$\Theta(\sqrt{n})$	$\Theta\left(n^2\right)$	$\Theta(n \log n)$	$\Theta(n\sqrt{n})$	$\Theta(\log n)$	$\Theta(n)$
loop3	○	○	○	○	○	○	◉ ✔	○
loop4	○	○	○	○	○	○	○	◉ ✔
loop1	○	○	○	○	○	○	○	◉ ✔
loop2	○	○	○	○	○	○	◉ ✔	○

Algorithm loop1(n)
$s = 1$
for $i = 1$ **to** n
  for $j = 1$ **to** n
    $s = s + 1$

Algorithm loop2(n)
$s = 1$
while $s \leq n$
  $s = s + 1$

Algorithm loop3(n)
$s = 0$
for $i = 1$ **to** n
  for $j = i$ **to** n
    for $k = i$ **to** j
      $s = s + 1$

For each of the above algorithms, state its execution time as a function of n in Θ-notation.

	$\Theta\left(n^3\right)$	$\Theta\left((\log n)^2\right)$	$\Theta(\sqrt{n})$	$\Theta\left(n^2\right)$	$\Theta(n \log n)$	$\Theta(n\sqrt{n})$	$\Theta(\log n)$	$\Theta(n)$
loop1	○	○	○	◉ ✔	○	○	○	○
loop2	○	○	○	○	○	○	○	◉ ✔
loop3	◉ ✔	○	○	○	○	○	○	○