Algorithm performance

Big-O: nested loops

By the end of this video you will be able to…

- Compute the big-O class of code with nested loops

```
public static int maxDifference (int[] vals) {
  int max = 0;
  for (int i=0; i < vals.length; i++) {
    for (int j=0; j < vals.length; j++) {
      if (vals[i] - vals[j] > max) {
        max = vals[i] - vals[j];
      }
    }
  }
  return max;
}
```

```
public static int maxDifference (int[] vals) {
  int max = 0;
  for (int i=0; i < vals.length; i++) {
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      if (vals[i] - vals[j] > max) {
        max = vals[i] - vals[j];
      }
    }
  }
  return max;
}
```

IVQ: sample run

```
public static int maxDifference (int[] vals) {
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    }
  }
  return max;
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        max = vals[i] - vals[j];
      }
    }
  }
  return max;
}
```

```
public static int maxDifference (int[] vals) {
   int max = 0;
   for (int i=0; i < vals.length; i++) {
      for (int j=0; j < vals.leng
         if (vals[i] -
            ma
      }
   }
   return
}
```

Count from the inside out

```
public static int maxDifference (int[] vals) {
  int max = 0;
  for (int i=0; i < vals.length; i++) {
    for (int j=0; j < vals.length; j++) {
      if (vals[i] - vals[j] > max) {
        max = vals[i] - vals[j];
      }
    }
  }
  return max;
}
```

```
public static int maxDifference (int[] vals) {
  int max = 0;
  for (int i=0; i < vals.length; i++) {
    for (int j=0; j < vals.length; j++) {
      if (vals[i] - vals[j] > max) {
        max = vals[i] - vals[j];
      }
    }
  }
  return max;
}
```

O(1)

```
public static int maxDifference (int[] vals) {
  int max = 0;
  for (int i=0; i < vals.length; i++) {
    for (int j=0; j < vals.length; j++) {
      
    }
  }
  return max;
}
```

O(1)

```
public static int maxDifference (int[] vals) {
   int max = 0;
   for (int i=0; i < vals.length; i++) {
      for (int j=0; j < vals.length; j++) {
      }
   }
   return max;
}
```

O(n)

```
public static int maxDifference (int[] vals) {
   int max = 0;
   for (int i=0; i < vals.length; i++) {
      {
      }
   }
   return max;
}
```

O(n)

```
public static int maxDifference (int[] vals) {
   int max = 0;
   for (int i=0; i < vals.length; i++) {
      {
      }
   }
   return max;
}
```

O(n)

```
public static int maxDifference (int[] vals) {
   int max = 0;
   for (int i=0; i < vals.length; i++) {
      {
      }
   }
   return max;
}
```

O(n)

$O(n^2)$

```
public static int maxDifference (int[] vals) {
   int max = 0;
   return max;
}
```

O(1)

O(n^2)

O(1)

```
public static int maxDifference (int[] vals) {
   int max = 0;
   return max;
}
```

O(1)

O(n^2)

O(1)

Total: O(n^2)