

# Practical Programming

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Exam in Practical Programming

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## Question about memory leak

Will these functions leak memory?

```
1 void stat(){
2     double a[500];
3 }

1 void vla(size_t n){
2     double a[n];
3 }

1 void mal(){
2     double* a = (double*) malloc(500 * sizeof(double));
3 }

1 void maf(){
2     double* a = (double*) malloc(500 * sizeof(double));
3     free(a);
4 }

1 double* mar(){
2     double* a = (double*) malloc(500 * sizeof(double));
3     return a;
4 }
```

## Problem

Implement the Bessel function of the first kind of integer index using Bessel's integral representation.

$$J_n(x) = \frac{1}{\pi} \int_0^\pi \cos(nt - x \sin(t)) \, dt. \quad (1)$$

Compare with the corresponding function from `<math.h>` or from GSL.