# Cornu Spiral

My Solutions ›

Consider the Fresnel integrals, defined by

$$C(t) = \int_0^t \cos\left(\frac{1}{2}\pi x^2\right)dx, \qquad S(t) = \int_0^t \sin\left(\frac{1}{2}\pi x^2\right)dx\ .$$

Write a script using the MATLAB function **integral.m** to plot a Cornu spiral, which is a smooth curve of $C(t)$ versus $S(t)$. Plot your solution over the range $-8 \le t \le 8$.

## Script

Reference Solution | Save | Reset | MATLAB Documentation (https://www.mathworks.com/help/)

```
c = @(x) cos(pi*x.^2/2) % assign the integrand for C(t)
s = @(x) sin(pi*x.^2/2) % assign the integrand for S(t)

tmin=-8; tmax=8; nt=2000;
t=linspace(tmin,tmax,nt);
C=zeros(nt,1); S=zeros(nt,1);
for i=1:nt
    C(i)=integral(@(x) c(x), 0, t(i)); % compute C(i) using integral.m and the integrand c(x) defined on top
    S(i)=integral(@(x) s(x), 0, t(i)); % compute S(i) using integral.m and the integrand s(x) defined on top
end
plot(S,C)
xlabel('$S(t)$', 'Interpreter', 'latex', 'FontSize',14);
ylabel('$C(t)$', 'Interpreter', 'latex', 'FontSize',14);
title('Cornu spiral', 'Interpreter', 'latex', 'FontSize',16);

```

▶ Run Script

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## Assessment: All Tests Passed

Submit

- ✓ **Check the values of C(t)**
- ✓ **Check the values of S(t)**

## Output

```
c =

  function_handle with value:

    @(x)cos(pi*x.^2/2)

s =

  function_handle with value:

    @(x)sin(pi*x.^2/2)
```