Math 451

QS #3 $F(x) = \int_0^x e^{-t^2}\,dt$ — plot — x | y

→ Variation: $F(x) = \int_0^x t + \cos(t)\,dt$

$= \frac{1}{2}t^2 + \sin(t) \Big|_0^x$

$= \left(\frac{1}{2}x^2 + \sin(x)\right) - (0)$

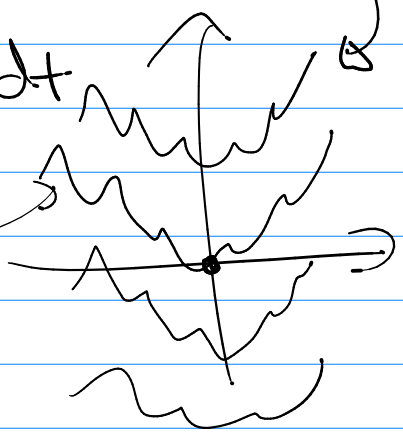
so $F(x) = \frac{1}{2}x^2 + \sin(x)$

Family of Anti Deriv

Find it: $\int x + \cos x\,dx = \frac{1}{2}x^2 + \sin x + C$

$F(x) = \int_0^x t + \cos t\,dt$

$F(x)$ ← an antiderivative



Plot $F(x) = \int_0^x e^{-t^2}\,dt$ over $0 \le x \le 10$

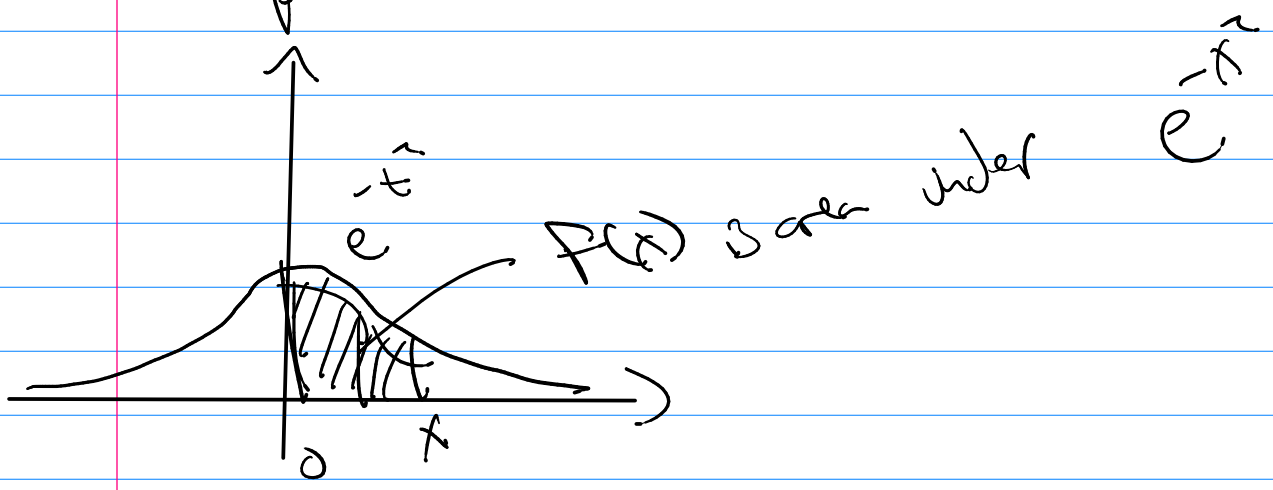
$x = \text{linspace}(0, 10, 1000)$

x	y
0	0
1	☐

$F(0) = \int_0^0 e^{-t^2}\,dt = 0$

$F(1) = \int_0^1 e^{-t^2}\,dt = $ ☐

```
for i = 1:length(x)
    y(i) = simpint(@(t) exp(-t.^2), 0, x(i), 30);
end
plot(x,y)
```



Apps & Computational Mathematics

Text — http://www.mathworks.com/moler.html

1st — Linear Equations Chapter

Note: Read → focus: pivot, backsolve, errors, exercises

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & 2 & 1 & 1 \\ 4 & 3 & 0 & 2 \end{bmatrix} \xrightarrow{r3} \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & \boxed{0} & -1 & 2 \\ 3 & 2 & 1 & 0 \end{bmatrix}$$

$s = \#0$?

① $A(i,i)$ is zero? Don't want this

b/c $S = A(k,i) / A(k,k)$

② $A(i,i)$ is $\boxed{\text{small?}}$ ← close to zero Don't want this

b/c $S = A(k,i) / A(k,k)$ small?

$\boxed{S}$ → large

Floats $\boxed{\pm}$ $\boxed{\text{digits}}$ $\boxed{\ }$ $10^{\boxed{\text{power}}}$

Pivot (row swap) to get the $A(k,k)$ value to be the largest in it's col.

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 7 & 1 & 2 \\ -4 & 3 & 2 & 1 \end{bmatrix}$$

for $i = 1 : n-1$

```
[MV mi] = max(abs(A(i:n, i)));
mi = mi + i - 1;
A([i mi], :) = A [mi i], :);
```

} gauss