```
> restart:with(linalg):with(plots):
Warning, the protected names norm and trace have been redefined and unprotected

Warning, the name changecoords has been redefined
```

```
> fx:=(1/sqrt(2*Pi*sigma^2))*exp(-((X-mu)/sigma)^2/2);
```

$$fx := \frac{1}{2}\frac{\sqrt{2}\ \mathbf{e}^{\left(-1/2\frac{(X-\mu)^2}{\sigma^2}\right)}}{\sqrt{\pi\,\sigma^2}}$$

More lightbulbs, but this time the population life (time to burnout) of "beamer" bulbs is established as normally distributed with mean of 100hrs. and standard deviation of 8hrs. What is the probability that a bulb, selected at random, will last between 110 and 120hrs.? Rethink this problem in terms of automotive front wheel bearings which have a relatively nasty habit of going sour at about 100Mms. (29)NDSP43s.mws, 04-03-19

```
> mu:=100:sigma:=8:a:=110:b:=120:P110to120:=int(fx,X=a..b);
```

$$P110to120 := \frac{1}{16}\,\mathrm{erf}\left(\frac{5}{4}\sqrt{2}\right)\sqrt{64} - \frac{1}{16}\,\mathrm{erf}\left(\frac{5}{8}\sqrt{2}\right)\sqrt{64}$$

```
> evalf(P110to120);
```

.0994401084

Given student annual income, normally distributed with mean at \$16k and standard deviation \$2k, find probabilities of a) Over \$18k, b) Under \$15k and c) Between \$15k and \$18k.

```
> mu:=16:sigma:=2:a:=15:b:=18:Pm18:=1/2-int(fx,X=mu..b);
```

$$Pm18 := \frac{1}{2} - \frac{1}{4}\,\mathrm{erf}\left(\frac{1}{2}\sqrt{2}\right)\sqrt{4}$$

```
> evalf(Pm18);
```

.1586552540

```
> Pl15:=1/2-int(fx,X=a..mu);
```

$$Pl15 := \frac{1}{2} - \frac{1}{4}\,\mathrm{erf}\left(\frac{1}{4}\sqrt{2}\right)\sqrt{4}$$

```
> evalf(Pl15);
```

.3085375388

```
> Pb15and18:=1-evalf(Pm18+Pl15);
```

$$Pb15and18 := .5328072072$$

Large class with grades average 78% & standard deviation 8%. Where to set grade boundary for close to 10% "A's"? Do a linear interpolation between 88% and 89% if you really feel anal about this.

```
> mu:=78:sigma:=8:A:=85:evalf(int(fx,X=mu..A)-2/5);
```

-.0907869529

```
> A:=88:evalf(int(fx,X=mu..A)-2/5);A:=89:evalf(int(fx,X=mu..A)-2/5);
```

-.0056497738

.0154342776