Practical-9:
Plot the line segment 'L' joining the point A=0 to B=2+π/4 *i* and give an exact calculation of ∫e^z dz

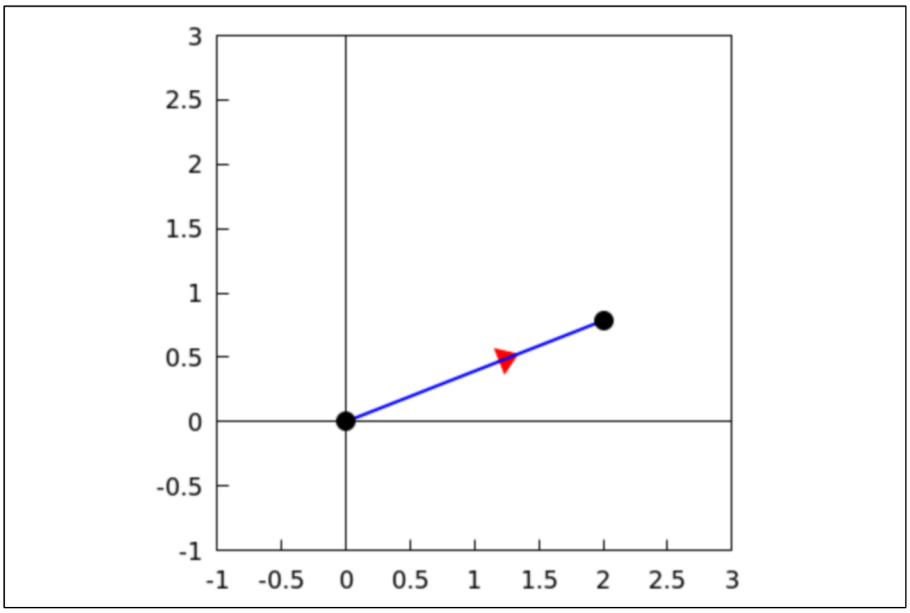
(%i1)
```
kill(all);
```
(%o0) *done*

(%i1)
```
z(t):=rectform(0·(1−t)+(2+(%pi/4)·%i)·t);
```
(%o1) $$z(t):=\#\{\text{Lisp function}\}\left(0\ (1-t)+\left(2+\frac{\pi}{4}\ \%i\right)\ t\right)$$

(%i2)
```
z(t);
```
(%o2) $$\frac{\%i\ \pi\ t}{4}+2\ t$$

(%i3)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[-1,3],
yaxis=true,yaxis_type=solid,yrange=[-1,3],
proportional_axes=xy,
head_length=0.7,
head_angle=10,
color=red,
vector([1,%pi/8],[1/3,%pi/24]),
color=blue,
line_width=2,
parametric(realpart(z(t)),imagpart(z(t)),t,0,1),
color=black,
point_type=7,
point_size=2,
points([[realpart(z(0)),imagpart(z(0))],[realpart(z(1)),imagpart(z(1))]]));
```

(%t3)



(%o3)

(%i4)
```
kill(all);
```
(%o0) *done*

(%i2)
```
a:0;b:1;
```
(a) 0
(b) 1

(%i3)
```
f(z):=exp(z);
```
(%o3) $f(z):=\exp(z)$

(%i5)
```
x(t):=2·t;y(t):=(%pi/4)·t;
```
(%o4) $x(t):=2\,t$

(%o5) $y(t):=\frac{\pi}{4}\,t$

(%i6) `z(t):=x(t)+%i·y(t);`

(%o6) $$z(t):=x(t)+\%i\,y(t)$$

(%i7) `R:rectform(f(z(t))·diff(z(t),t));`

(R) $$\%i\left(2\,\%e^{2\,t}\sin\left(\frac{\pi\,t}{4}\right)+\frac{\pi\,\%e^{2\,t}\cos\left(\frac{\pi\,t}{4}\right)}{4}\right)-\frac{\pi\,\%e^{2\,t}\sin\left(\frac{\pi\,t}{4}\right)}{4}+2\,\%e^{2\,t}\cos\left(\frac{\pi\,t}{4}\right)$$

(%i8) `I:integrate(R,t,a,b);`

(I) $$\frac{\%e^{2}\,\%i+\%e^{2}-\sqrt{2}}{\sqrt{2}}$$

(%i9) `kill(all);`

(%o0) *done*

(%i1)
```
cIntegral(x,y,a,b):=block(
f(z):=exp(z),
z(t):=rectform(x·(1−t)+y·t),
rectform(integrate(rectform(f(z(t))·diff(z(t),t)),t,a,b)));
```

(%o1) $$\text{cIntegral}(x,y,a,b):=\text{block}(f(z):=\exp(z),z(t):=\#\{\text{Lisp function}\}(x\,(1-t)+y\,t),\#\{\text{Lisp function}\}\left(\int_a^b \#\{\text{Lisp function}\}\left(f(z(t))\left(\frac{d}{d\,t}z(t)\right)\right)d\,t\right))$$

(%i2) `cIntegral(0,(2+(%pi/4)·%i),0,1);`

(%o2) $$\frac{\%e^{2}\,\%i}{\sqrt{2}}+\frac{\%e^{2}-\sqrt{2}}{\sqrt{2}}$$

(%i3) `kill(all);`

(%o0) *done*

(%i1) `f(z):=sin(z);`

(%o1) $$f(z):=\sin(z)$$

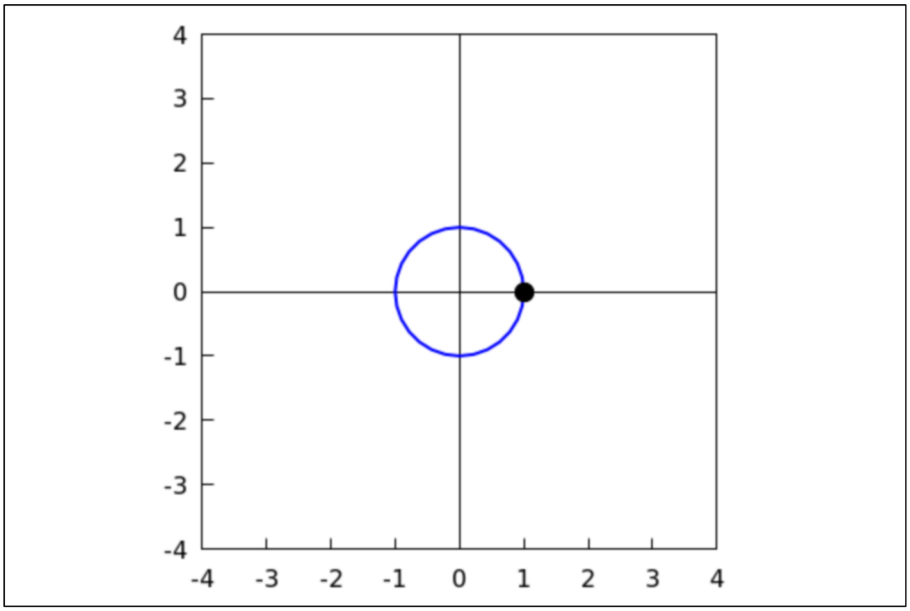
(%i2) `z(t):=cos(t)+%i·sin(t);`

(%o2) $$z(t):=\cos(t)+\%i\,\sin(t)$$

(%i3)
```
R:rectform(f(z(t))·diff(z(t),t));
```
(R)
$$(\cos(t)\sin(\cos(t))\cosh(\sin(t))-\sin(t)\cos(\cos(t))\sinh(\sin(t)))$$
$$-\cos(t)\cos(\cos(t))\sinh(\sin(t))-\sin(t)\sin(\cos(t))\cosh(\sin(t))$$

(%i4)
```
I:integrate(R,t,0,2·%pi);
```
(I)
$$0$$

(%i11)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[−4,4],
yaxis=true,yaxis_type=solid,yrange=[−4,4],
proportional_axes=xy,
color=blue,
line_width=2,
parametric(realpart(z(t)),imagpart(z(t)),t,0,2·%pi),
color=black,
point_type=7,
point_size=2,
points([[realpart(z(0)),imagpart(z(0))],[realpart(z(2·%pi)),imagpart(z(2·%pi))]]))
```
(%t11)



(%o11)