3 rd

1 o

i)

```
z = -1 - I;
Arg[z]
```

$$-\frac{3\pi}{4}$$

ii)

In[7]:=
```
Integrate[x Exp[-2 x], x]
Integrate[x Exp[-2 x], {x, 0, 1}]
N[Integrate[x Exp[-2 x], {x, 0, 1}]]
```

Out[7]= $e^{-2x}\left(-\frac{1}{4}-\frac{x}{2}\right)$

Out[8]= $\frac{1}{4}-\frac{3}{4e^2}$

Out[9]= 0.1484985

2 o

i)

In[1]:=
```
A = {{1, 2, -1}, {2, 0, 3}, {-1, 3, 2}};
MatrixForm[A]
B = Transpose[A];
MatrixForm[B]
A - B // MatrixForm
Det[A.B]
```

Out[2]//MatrixForm=

$$\begin{pmatrix} 1 & 2 & -1 \\ 2 & 0 & 3 \\ -1 & 3 & 2 \end{pmatrix}$$

Out[4]//MatrixForm=

$$\begin{pmatrix} 1 & 2 & -1 \\ 2 & 0 & 3 \\ -1 & 3 & 2 \end{pmatrix}$$

Out[5]//MatrixForm=

$$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

Out[6]= 841

ii)

```
Integrate[1 / (x (x^2 + 5)), x]
```

$$\frac{\text{Log}[x]}{5} - \frac{1}{10}\text{Log}\left[5 + x^2\right]$$

3 o

In[17]:=
```
f[x_] := x / (x^2 + 1)
Print["1st Derivative : ", Simplify[D[f[x], x]]]
Print["Critical Points : ", Solve[D[f[x], x] == 0, x]]
Print["2nd Derivative : ", Simplify[D[D[f[x], x], x]]]
Print["Inflection Points : ", Solve[D[D[f[x], x], x] == 0]]
Plot[f[x], {x, -3, 3}, AxesOrigin → {0, 0}, PlotRange → All,
 BaseStyle → {FontFamily → "Arial", FontSize → 12},
 AxesLabel → {"x", "f(x)"},
 PlotStyle → {Red, Thickness[0.005]}]
```

1st Derivative : $\frac{1 - x^2}{\left(1 + x^2\right)^2}$

Critical Points : $\{\{x \to -1\}, \{x \to 1\}\}$

2nd Derivative : $\frac{2\,x\left(-3 + x^2\right)}{\left(1 + x^2\right)^3}$

Inflection Points : $\left\{\{x \to 0\}, \left\{x \to -\sqrt{3}\right\}, \left\{x \to \sqrt{3}\right\}\right\}$

Out[22]=