2 nd

1 o

i)

```
z = (1 + I) / (1 - I);
Simplify[z]
```

i

ii)

```
Integrate[x Sin[2 x], x]
Integrate[x Sin[2 x], {x, 0, Pi}]
```

$$-\frac{1}{2} x \cos[2x] + \frac{1}{4} \sin[2x]$$

$$-\frac{\pi}{2}$$

2 o

i)

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

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

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

$$\begin{pmatrix} 5 & 1 & 4 \\ 1 & 3 & -2 \\ 4 & -2 & 6 \end{pmatrix}$$

i)

```
Integrate[1 / (x^2 + 4 x + 5), x]
Integrate[1 / (x^2 + 4 x + 5), {x, -1, 1}]
```

$$\text{ArcTan}[2 + x]$$

$$-\frac{\pi}{4} + \text{ArcTan}[3]$$

3 o

i)

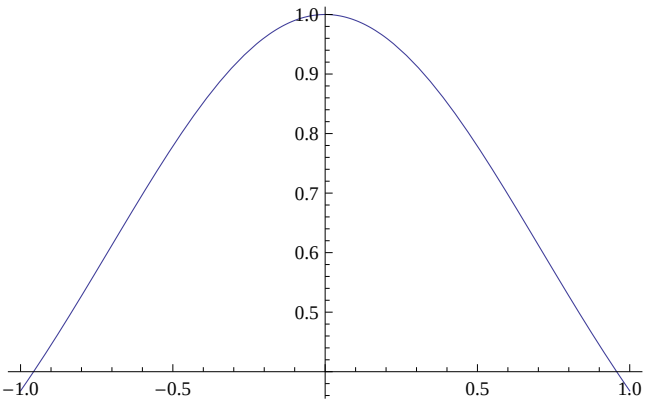
```
f[x_] := Exp[-x^2]
D[f[x], x]
Solve[D[f[x], x] == 0, x]
Simplify[D[D[f[x], x], x]]
Simplify[D[D[f[x], x], x]] /. x → 0
Plot[f[x], {x, -1, 1}]
```

$$-2\, e^{-x^2}\, x$$

$$\{\{x \to 0\}\}$$

$$e^{-x^2}\left(-2 + 4\, x^2\right)$$

$$-2$$



ii)

```
Series[f[x], {x, 0, 2}]
```

$$1 - x^2 + O[x]^3$$