1. PRAKTIKA

1. ARIKETA

Lortu zerrenda bat 8 zenbakiaren lehenengo 50 multiploen erro karratuekin.

```
zerrenda = Table[Sqrt[8 * i], {i, 1, 50}]
           tabla  raíz cuadrada
```

$$\{2\sqrt{2}, 4, 2\sqrt{6}, 4\sqrt{2}, 2\sqrt{10}, 4\sqrt{3}, 2\sqrt{14}, 8, 6\sqrt{2}, 4\sqrt{5}, 2\sqrt{22},$$
$$4\sqrt{6}, 2\sqrt{26}, 4\sqrt{7}, 2\sqrt{30}, 8\sqrt{2}, 2\sqrt{34}, 12, 2\sqrt{38}, 4\sqrt{10}, 2\sqrt{42},$$
$$4\sqrt{11}, 2\sqrt{46}, 8\sqrt{3}, 10\sqrt{2}, 4\sqrt{13}, 6\sqrt{6}, 4\sqrt{14}, 2\sqrt{58}, 4\sqrt{15},$$
$$2\sqrt{62}, 16, 2\sqrt{66}, 4\sqrt{17}, 2\sqrt{70}, 12\sqrt{2}, 2\sqrt{74}, 4\sqrt{19}, 2\sqrt{78}, 8\sqrt{5},$$
$$2\sqrt{82}, 4\sqrt{21}, 2\sqrt{86}, 4\sqrt{22}, 6\sqrt{10}, 4\sqrt{23}, 2\sqrt{94}, 8\sqrt{6}, 14\sqrt{2}, 20\}$$

12. elementua zerrendatik erauzi

```
zerrenda[[12]]
```

$$4\sqrt{6}$$

Azken bi elementuen arteko zatiketa kalkulatu

```
zerrenda[[50]] / zerrenda[[49]]
```

$$\frac{5\sqrt{2}}{7}$$

2. ARIKETA

Funtzioaren definizioak

```
g[x_, y_] = (Cos[x^3 + y^3]) / (x - y + 1)
            coseno
```

$$\frac{\text{Cos}\left[x^3 + y^3\right]}{1 + x - y}$$

```
f[x_] = x^3 - 2 x + 1
```

$$1 - 2\,x + x^3$$

```
h[x_] = x^2 - 3 x + 2
```

$$2 - 3\,x + x^2$$

a) Kalkulatu g(Pi,2Pi) eta idatzi emaitza era hurbilduan

```
g[Pi, 2 Pi]
```
núme… número pi

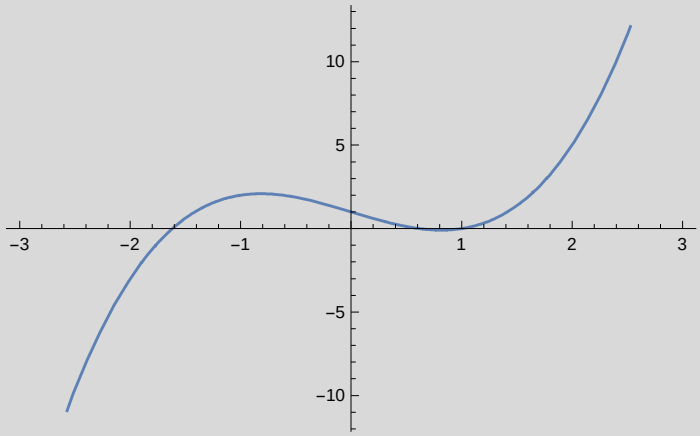
```
g[Pi, 2 Pi] // N
```
núme… número pi va

$$\frac{\text{Cos}\left[9\,\pi^3\right]}{1 - \pi}$$

```
0.399233
```

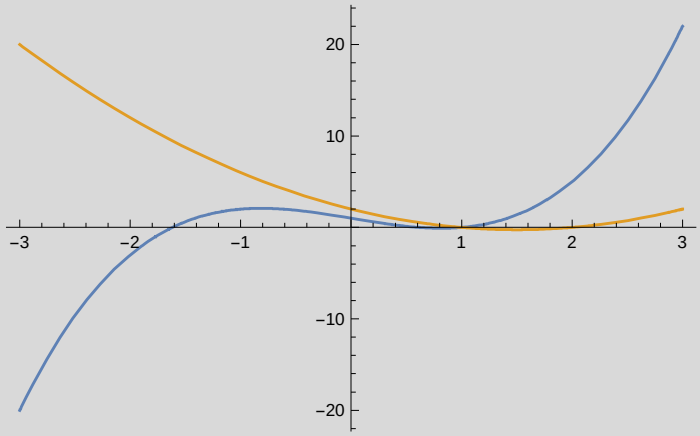
b) Irudikatu f funtzioa (-3,3) tartean

```
Plot[f[x], {x, -3, 3}]
```
representación gráfica



c) Irudikatu, grafiko berean, f eta h funtzioak (-3,3) tartean

```
Plot[{f[x], h[x]}, {x, -3, 3}]
```
representación gráfica



3. ARIKETA

Matrizea definitu:

```
c = {{4, 1, 3, 1, 3}, {2, 6, 3, -1, 2},
   {1, 3, 4, 1, 1}, {-4, 5, 4, 2, -3}, {1, -1, -3, -1, 2}};
MatrixForm[
```
forma de matriz
```
 c]
```

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

a) 3. zutabea erauzi

```
ct = Transpose[c];
```
transposición
```
ct[[3]]
```

```
{3, 3, 4, 4, -3}
```

b)a13 elementuari elkartutako minorea kalkulatu

```
azpimat = c[[{2, 3, 4, 5}, {1, 2, 4, 5}]];
Det[azpimat]
```
determinante

$$-63$$

c)c matrizearen alderantzikoa kalkulatu (emaitza era matrizialean adierazi)

```
alder = Inverse[c] // MatrixForm
```
matriz inversa forma de matriz

$$\begin{pmatrix} \frac{91}{120} & \frac{7}{24} & -\frac{4}{3} & \frac{5}{24} & -\frac{9}{20} \\ \frac{41}{120} & \frac{5}{24} & -\frac{2}{3} & \frac{7}{24} & \frac{1}{20} \\ -\frac{21}{40} & -\frac{1}{8} & 1 & -\frac{3}{8} & -\frac{3}{20} \\ \frac{7}{8} & -\frac{1}{8} & -1 & \frac{5}{8} & \frac{1}{4} \\ -\frac{67}{120} & -\frac{7}{24} & \frac{4}{3} & -\frac{5}{24} & \frac{13}{20} \end{pmatrix}$$

4. ARIKETA

Matrizearen definizioa:

```
e = {{1, 1, 1, 1}, {-m, 1, 1, 2}, {1, -m, 1, 3}, {1, 1, -m, 4}};
MatrixForm[e]
```
forma de matriz

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

a)e matrizeko elementuak sortzen duten V bektorea kalkularu

```
V = Flatten[e]
```
aplana

$$\{1, 1, 1, 1, -m, 1, 1, 2, 1, -m, 1, 3, 1, 1, -m, 4\}$$

b) Kalkulatu e matrizearen heina m parametroaren arabera

```
Solve[Det[e] == 0, m]
```
resuelve determinante

$$\{\{m \to -7\}, \{m \to -1\}, \{m \to -1\}\}$$

m≠-7 eta m≠-1 denean, heina 4 da

```
MatrixRank[e /. m → -7]
```
rango matricial

```
3
```

m = -7 denean, heina 3 da

```
MatrixRank[e /. m → -1]
```
rango matricial

```
2
```

m = -1 denean, heina 2 da

c)Kalkulatu m=2 denean e matrizearen alderantizkoa

```
Inverse[e /. m → 2] // MatrixForm
```
matriz inversa forma de matriz

$$\begin{pmatrix} \frac{1}{3} & -\frac{8}{27} & \frac{1}{27} & \frac{1}{27} \\ \frac{1}{3} & \frac{2}{27} & -\frac{7}{27} & \frac{2}{27} \\ \frac{1}{3} & \frac{1}{9} & \frac{1}{9} & -\frac{2}{9} \\ 0 & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \end{pmatrix}$$

d)Kalkulatu e^5 m=-1 denean

```
MatrixPower[e /. m → -1, 5] // MatrixForm
```
potencia matricial forma de matriz

$$\begin{pmatrix} 778 & 778 & 778 & 2332 \\ 1037 & 1037 & 1037 & 3110 \\ 1296 & 1296 & 1296 & 3888 \\ 1555 & 1555 & 1555 & 4666 \end{pmatrix}$$

5. ARIKETA

Matrizearen definizioa

```
d = {{1, a, -1, 1}, {2, 1, -a, 2}, {1, -1, -1, a - 1}};
MatrixForm[d]
```
forma de matriz

$$\begin{pmatrix} 1 & a & -1 & 1 \\ 2 & 1 & -a & 2 \\ 1 & -1 & -1 & -1+a \end{pmatrix}$$

a) D matrizearen heina kalkulatu

```
Minoreak = Minors[d, 3]
```
menores

$$\left\{\left\{2+a-a^2,\ -2+5\,a-2\,a^2,\ -4+4\,a-a^2,\ 2\,a+a^2-a^3\right\}\right\}$$

```
Solve[Minoreak == {{0, 0, 0, 0}}, a]
```
resuelve

$$\{\{a \to 2\}\}$$

a ≠2 denean, heina 3 da

```
MatrixRank[d /. a → 2]
```
rango matricial

2

a =2 denean, heina 2 da

b) a=3 denean, 2. eta 3. errenkadak eta 1. eta 3. zutabeak dituen B azpimatrizearen heina kalkulatu

```
d1 = d /. a -> 3;
Bazpim = d1[[{2, 3}, {1, 3}]]
```

$$\{\{2, -3\}, \{1, -1\}\}$$

```
MatrixRank[Bazpim]
```
rango matricial

2

c)a=2 denean, D matrizearen 2. ordenako minoreak kalkulatu

```
d2 = d /. a → 2
```

```
{{1, 2, -1, 1}, {2, 1, -2, 2}, {1, -1, -1, 1}}
```

```
Minors[d2, 2]
```
menores

```
{{-3, 0, 0, -3, 3, 0}, {-3, 0, 0, -3, 3, 0}, {-3, 0, 0, -3, 3, 0}}
```