1.1. $\frac{x^{n+2}}{x^{n-2}} = \frac{x^{n-2+4}}{x^{n-2}} = x^4$

1.2 $x^{-1} \cdot 8 = 2 \rightarrow x^{-1} \cdot 2^3 = 2 \rightarrow x^{-2} = \frac{2}{2^3} = \frac{1}{4}$

1.3 $(5^{10})^0 = 1$

1.4. $\frac{\sqrt{4x}}{\sqrt{x}} = \frac{2\sqrt{x}}{\sqrt{x}} = 2$

1.5 $x^2 + (x+1)^2 = (x+2)^2$

$x^2 + x^2 + 2x + 1 = x^2 + 4x + 4$

$x^2 - 2x - 3 = 0$

$(x+1) \cdot (x-3) = 0$

$x_1 = -1$

$x_2 = 3$

1.6 $2^x > 1024$

$2^x > 2^{10}$

$x > 10$

2.1

$X = 32 + 1{,}8x$

$32 + 1{,}8x = X \rightarrow 32 = -0{,}8X \rightarrow x = -40$

2.2/

$f(x) = 5x + 4$

$f(3) = 5 \cdot 3 + 4$

$f(3) = 19$

2.3/

$x^2 - 4x + 3 = 0$

$(x-1) \cdot (x-3) = 0$

$x_1 = 1$

$x_2 = 3$

2.4/

~~$10 \cdot 1{,}02^{90} = 59{,}43$~~

2.5/ $e^{\ln 5} = 5$

3.1/ $\sum_{i=1}^{\infty} \frac{12}{6^i} = a_n \; 12 \cdot \frac{1}{6^i} \qquad a = 12 \qquad q = \frac{1}{6}$

$$\sum_{i=1}^{\infty} 12_{6^i} = \frac{12 \cdot \frac{1}{6}}{1 - \frac{1}{6}} = \frac{2}{\frac{5}{6}} = \frac{6 \cdot 2}{5} = \frac{12}{5}$$

3.2/ $$\lim_{x \mapsto 1} \frac{6^{(1-x)}}{x} = \frac{6^{1-x} \cdot 6^x}{x \cdot 6^x} = \frac{6}{x \cdot 6^x} \approx \frac{6}{1 \cdot 6^1} = 1$$

$x \mapsto 1$ $\qquad$ $x \mapsto 1$

3.3/ $f(x) = x^5 - 8$

$f'(x) = 5x^4$

$f(-3) = 5(-3)^4 = 81 \cdot 5 = 405$

3.4/ 

3.5/ $\frac{d^2}{dx^2} \cdot 4x^4 + 4x^2$

$d_1 = 16x^3 + 8x \qquad d_2 = 48x^2 + 8$

3.6/ $\frac{d}{dx} \frac{\ln x}{e^x} = \frac{1/x \cdot e^x - \ln x \cdot e^x}{(e^x)^2} = \frac{1/x - \ln x}{e^x}$

3.8/ $f(x,y) = x^2 + y^3 \quad f(2,3) = 2^2 + 3^3 = 31$

3.9/ $f(x,y) = \ln(x-y) \Rightarrow (x-y) > 0 \qquad x > y$

3.10/ $\frac{\partial}{\partial x} x^5 + xy^3 = 5x^4 + y^3$

3.11 $f(x,y) = x^2y^2 + 10$

$f'_x = 2xy^2$

$f'_x = 2xy^2$

$f'_y = x^2 2y$

$x = 0$

3.12/

$x + y = 10$

$2xy^2 - \lambda = 0$

$2yx^2 - \lambda = 0$

$2xy^2 = 2yx^2$

$x = y$

$x + y - 10 = 0$

$x = y$

$x + y = 10$

$x = y = 5$

4.1

$$\begin{bmatrix} 1 & 1 & 7 \\ 2 & 8 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 6 \\ 5 & 1 \\ 1 & 9 \end{bmatrix}$$

$1\cdot2+6\cdot2$ $\quad$ $2\cdot1+6\cdot8$ $\quad$ $2\cdot7+6\cdot2$

$1\cdot5+2\cdot1+1\cdot1+9\cdot2$ $\quad$ $5\cdot1+8\cdot1+1\cdot1+9\cdot8$ $\quad$ $5\cdot7+1\cdot2+1\cdot7+9\cdot2$

$$\begin{matrix} 14 & 50 & 23 \\ 7 & 13 & 37 \\ 19 & 73 & 25 \end{matrix}$$

4.2

$$\begin{bmatrix} 2 & 2 \\ 4 & 6 \\ 1 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 9 & 1 \\ 2 & 1 & 2 \end{bmatrix}$$

$1\cdot2+9\cdot4+1\cdot1+2\cdot2+1\cdot4+1\cdot2$ $\quad$ $1\cdot2+9\cdot6+1\cdot3+2\cdot2+1\cdot6+2\cdot3$

$$\begin{matrix} 39 & 59 \\ 10 & 16 \end{matrix}$$

4.3

$$\begin{bmatrix} 7.1 & 9.7 & 4.7 \\ 2 & 7.8 & 1.1 \\ 4 & 4.44 & 0 \end{bmatrix} = \begin{bmatrix} 7.1 & 2 & 4 \\ 9.1 & 7.8 & 4.44 \\ 4.7 & 1.1 & 0 \end{bmatrix}$$

4.4/

$$\begin{bmatrix} 1 & 9 \\ 2 & 8 \end{bmatrix} \quad det = 1\cdot8 - 9\cdot2 = -10$$

5.1

| $d_2$ \ $d_1$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | 11 | 21 | 31 | 41 | 51 | 61 |
| 2 | 12 | 22 | 32 | 42 | 52 | 62 |
| 3 | 13 | 23 | 33 | 43 | 53 | 63 |
| 4 | 14 | 24 | 34 | 44 | 54 | 64 |
| 5 | 15 | 25 | 35 | 45 | 55 | 65 |
| 6 | 16 | 26 | 36 | 46 | 56 | 66 |

5.2/

| Doug User | Doug test | |
|---|---|---|
| Y (1%) | 99% | 1% |
| N (99%) | 0,5% | 99,5% |

$$\sum = 1\% + 99\% \cdot 0{,}5\% = 1{,}485\%$$