

$$1.1. \frac{x^{n+2}}{x^{n-2}} = \frac{x^{n-2+4}}{x^{n-2}} = x^4 \quad \text{L.S}$$

$$1.2. \begin{aligned} x^{-1} \cdot 8 &= 2 \\ x^{-1} \cdot 2^3 &= 2 \\ x^{-1} &= \frac{2}{2^3} = \frac{1}{4} \\ x &= 4 \end{aligned} \quad \begin{aligned} x^3 + 5x &= 4 \\ x = x^3 + 5x \\ x^3 - 4x &= 0 \\ x(x^2 - 4) &= 0 \\ x(x-2)(x+2) &= 0 \\ x &= 0, 2, -2 \end{aligned}$$

$$1.3. (5^{10})^0 = 1 \quad \text{L.S}$$

$$1.4. \frac{\sqrt{4x}}{\sqrt{x}} = \frac{2\sqrt{x}}{\sqrt{x}} = 2 \quad \begin{aligned} 0 &= x^2 + x - 5x \\ 0 &= (x-5)(1-x) \end{aligned} \quad \text{L.S}$$

$$1.5. \begin{aligned} x^2 + (x+1)^2 &= (x+2)^2 \\ x^2 + x^2 + 2x + 1 &= x^2 + 4x + 4 \\ x^2 - 2x - 3 &= 0 \\ (x+1)(x-3) &= 0 \\ x_1 &= -1, x_2 = 3 \end{aligned} \quad \begin{aligned} 1 &= x \\ 2 &= 5x \end{aligned} \quad \text{L.S}$$

$$1.6. \begin{aligned} 2^x &> 1024 \\ 2^x &> 2^{10} \\ x &> 10 \end{aligned} \quad \text{L.S}$$

2.1.

$$+100 \begin{pmatrix} 0 & 32 \\ 100 & 212 \end{pmatrix} + 180$$

$$y = 32 + 1.8x$$

$$32 + 1.8x = x$$

$$32 = -0.8x$$

$$x = -40$$

2.2

$$f(x) = 5x + 4$$

$$f(3) = 5 \cdot 3 + 4 = 19$$

2.3

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

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

$$x_1 = 1$$

$$x_2 = 3$$

2.4.

$$10 \cdot 1.02^{90} = 59.4313$$

in case of cont. comp.

$$10 \cdot e^{90 \times 0.02} = 60.4964$$

2.5

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

3.1

$$\sum_{i=1}^{\infty} \frac{12}{6^i} = a_n = 12 \cdot \frac{1}{6} \quad a=12 \quad b=\frac{1}{6}$$

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

3.2

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

$$3.3 \quad f(x) = x^5 - 8$$

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

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

$$3.4 \quad \frac{d}{dx} \frac{x^3 + 2x - 1}{x - 2} = \frac{(3x^2 + 2)(x - 2) - (x^3 + 2x - 1) \cdot 1}{(x - 2)^2} =$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2} = \frac{3x^3 - 6x^2 + 2x - 4 - x^3 - 2x + 1}{x^2 - 4x + 4} =$$

$$3.5 \quad \frac{d^2}{dx^2} (4x^4 + 4x^2) = \frac{2x^3 - 6x^2 - 3}{x^2 - 4x + 4}$$

$$d_1 = 16x^3 + 8x$$

$$d_2 = 48x^2 + 8$$

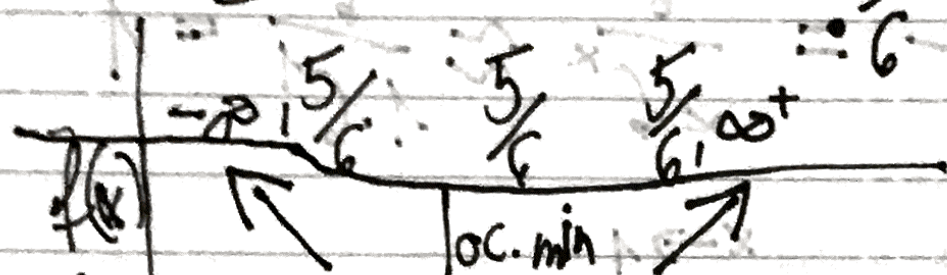
$$3.6 \frac{d}{dx} \frac{\ln x}{e^x} = \frac{\frac{1}{x} \cdot e^x - \ln x \cdot e^x}{(e^x)^2} = \frac{\frac{1}{x} - \ln x}{e^x}$$

$$3.7 \quad 3x^2 - 5x + 2$$

stat. point = $\frac{5}{6}$

$$d_1 = 6x - 5 \quad 6x - 5 = 0 \Rightarrow x = \frac{5}{6} \quad d_2 = 6 \Rightarrow \text{local min}$$

$$d_2 = 6 \quad 3x^2 - 5x + 2 = 0 \quad \frac{5 \pm \sqrt{25 - 24}}{6}$$



$f(x)$	—	0	+
$f'(x)$	+	+	+

crosses at $\frac{2}{3}$ and 1

$$3.8 \quad f(x, y) = x^2 + y^3 \quad f(2, 3) = 2^2 + 3^3 = 4 + 27 = 31$$

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

$$x > y$$

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

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

$$f'_x = 2xy^2 \quad x=0$$

$$f'_x = 2xy^2 \quad f'_y = x^2 2y$$

$$2(0)y^2 = 0$$

$$f''_{xx} = 2y^2$$

$$f''_{yy} = x^2 \cdot 2$$

$$f''_{xy} = x^2 2y \quad y=0$$

$$x^2 \cdot 2(0) = 0$$

loc. min for every $x=0$
or $y=0$ coordinates

3.12 $\max x^2 y^2 \quad x+y=10$

$$2xy^2 - \lambda = 0$$

$$2yx^2 - \lambda = 0$$

$$x+y-10=0$$

$$x=y$$

$$2xy^2 = 2yx^2$$

$$x=y$$

$$x+y=10$$

$$x=y=5$$

4.1.

$$\begin{bmatrix} 2 & 6 \\ 5 & 1 \\ 1 & 9 \end{bmatrix} \begin{bmatrix} 1 & 1 & 7 \\ 2 & 8 & 2 \\ 1.2+ & 2.1+ & 2.7+ \\ 6.2 & 6.8 & 6.2 \\ 1.5+ & 5.1+ & 5.7+ \\ 2.1 & 8.1 & 1.2 \\ 1.1+ & 1.1+ & 1.7+ \\ 9.2 & 9.8 & 9.2 \end{bmatrix} = \begin{bmatrix} 14 & 50 & 26 \\ 7 & 13 & 37 \\ 19 & 73 & 25 \end{bmatrix}$$

4.2.

$$\begin{bmatrix} 1 & 9 & 1 \\ 2 & 1 & 2 \end{bmatrix} \begin{bmatrix} 2 & 2 \\ 4 & 6 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 39 & 59 \\ 10 & 16 \end{bmatrix}$$

4.3

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

4.4

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

5.1

d_1	1	2	3	4	5	6	
d_2	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	

sample space

5.2

	Drug test	
Drug user	+	-
Y (1%)	99%	1%
N (99%)	0.5%	99.5%

$$\Sigma \cdot 1\% + 99\% + 99\% \cdot 0.5\% = 1.485\%$$

5.3

based on 5.2 data

Drug user	Drug test			
	+	-		
Y	1.0,99 99	1.0,01	= 0,99%	0,01%
N	99.00 5	99.0,995	0,495%	98,505%

$$\frac{0,99\%}{0,99\% + 0,495\%} = \frac{2}{3} = 66,7\%$$