**1.Elementary Algeria**

1.1: x4

1.2: x=4

1.3: 1

1.4: 2

1.5: x1=-1, x2=3

1.6: x>10

**2. Functions of one variable**

2.1: x=-40, y=-40, at -40 will both scales have the same temperature

2.2: y=19

2.3: x1=1, x2=3

2.4: (1+2%)90\*10=59.43

2.5: 5

**3. Calculus**

3.1: 12/5

3.2: 1

3.3: 405

3.4: 2x3-6x2-3/(x-2)2

3.5: 48x2+8

3.6: e-x(1-x\*lnx)/x

3.7:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | X<4/6 | 4/6 | 4/6<x<5/6 | 5/6 | 5/6<x<1 | 1 | x>1 |
| F(x) | + | 0 | - | - | - | 0 | + |
| F’(x) | - | - | - | 0 | + | + | + |
| Slope | 🡖 | 🡖 | 🡖 | Min | 🡕 | 🡕 | 🡕 |

F’’(x)=6>0, so the function is convex.

3.8: 31

3.9: (x,y) ∈R2, x>y

3.10: f’x(x,y)=5x4+y3  f’y(x,y)=3xy2

3.11: set f’x(x,y)=2xy= f’y(x,y)=0 get x=y=0. So (0,0) is the global minimum.

3.12: Let f(x.y)=x2y2 g(x,y)=x+y-10, use Lagvangian multiplier set all partial derivative as 0, we get x=y=5.

So the maximum is 6250.

**4.Linear Algebra**

4.1: {(14,50,26) ;(7,13,37) ;(19,73,25)}

4.2: {(39,59) ;(10,16)}

4.3: {(7.1,2,4) ;(9.1,7.8,4.44) ;(4.7,1.1,0)}

4.4: 1\*8-2\*9=-10

**5. Probability theory**

5.1: 36

5.2: 1%\*99%+99%\*0.5%=1.485%

5.3: 66.67%