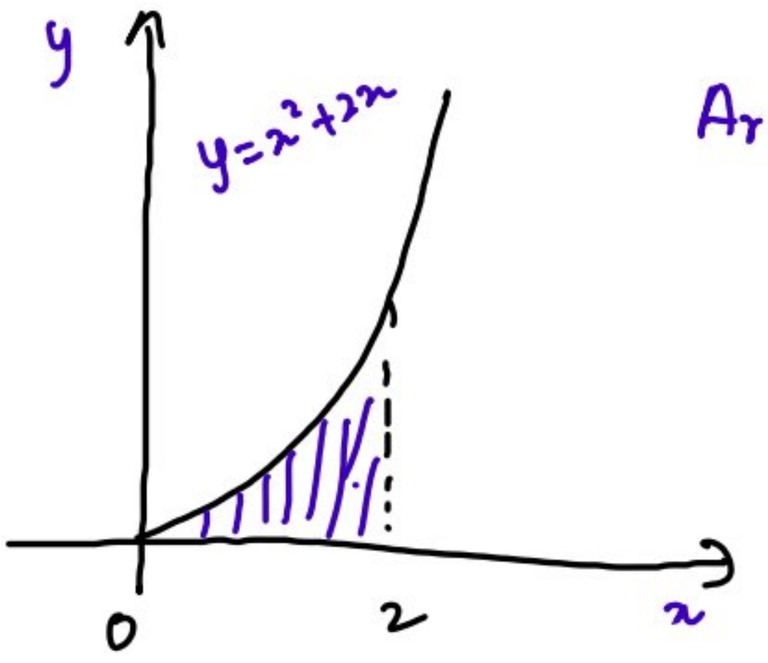
① 

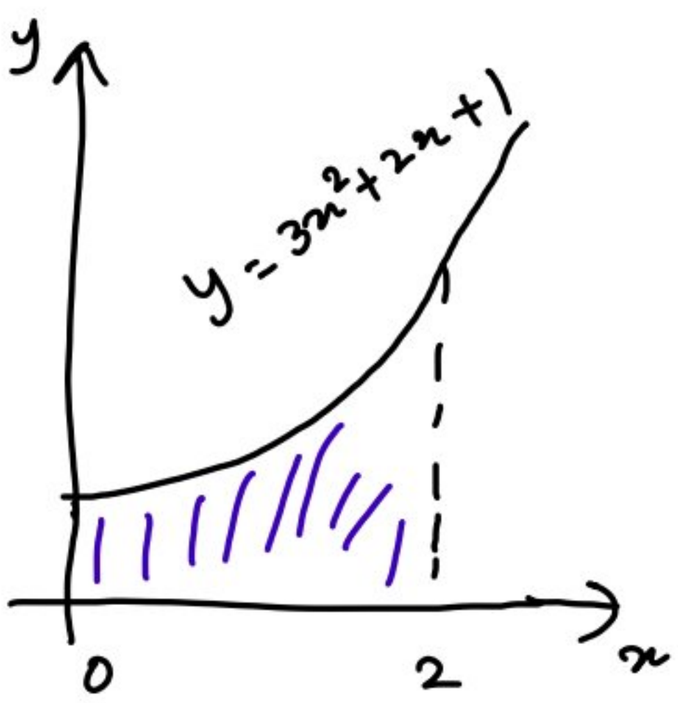
$$\text{Area} = \int_0^2 (x^2+2x)\,dx$$

$$= \left[\frac{x^3}{3} + x^2\right]_0^2$$

$$= \left(\frac{2^3}{3} + 2^2\right) - \left(\frac{0^3}{3} + 0^2\right)$$

$$= \frac{8}{3} + 4 - 0 = \frac{8+12}{3} = \frac{20}{3}$$

---

② 

$$\text{Area} = \int_0^2 (3x^2+2x+1)\,dx$$

$$= \left[\frac{3x^3}{3} + \frac{2x^2}{2} + 1x\right]_0^2 = \left[x^3+x^2+x\right]_0^2$$

$$= \left(2^3+2^2+2\right) - \left(0^3+0^2+0\right)$$

$$= (8+4+2) - 0 = 14$$

---

③ 24, 56, 12, 45, 21, 43, 21, 22

12, 21 | 21, 22 | 24, 43 | 45, 56

Q_1 Q_2 Q_3

$$\text{median} = \frac{22+24}{2} = 23$$

$$Q_1 = \frac{21+21}{2} = 21$$

---

④ 75, 82, 90, 64, 77, 85, 79, 92

64, 75 | 77, 79 | 82, 85 | 90, 92

$$\text{median} = Q_2 = \frac{79+82}{2}$$

$$= 80.5$$

$$Q_1 = \frac{75+77}{2} = 76$$

$$Q_3 = \frac{85+90}{2} = 87.5$$

- min = 64
- $Q_1 = 76$
- $Q_2 = 80.5$
- $Q_3 = 87.5$
- max = 92

(5) $A = \begin{pmatrix} 2 & 1 & 3 \\ 4 & x & 2 \\ 1 & 3 & 2 \end{pmatrix}$ $\det(A) = 5$

$\det(A) = 2(2x-6) - 1(4\times2 - 2\times1) + 3(4\times3 - x) = 5$

$4x - 12 - 1(8-2) + 3\times12 - 3x = 5$

$4x - 3x - 12 - 6 + 36 = 5$

$x + 18 = 5$

$x = 5 - 18 = -13$ //

---

(6) $A = \begin{pmatrix} 2 & x & 3 \\ 0 & 1 & 4 \\ 2 & 3 & 5 \end{pmatrix}$ $\det(A) = 1$

$\det(A) = 2(1\times5 - 3\times4) - x(0\times5 - 4\times2) + 3(0\times3 - 1\times2) = 1$

$2(5-12) - x(0-8) + 3(0-2) = 1$

$-14 + 8x - 6 = 1$

$8x = 1 + 14 + 6 = 21$

$x = \frac{21}{8}$ //

---

(7) $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ $\det(A) = 1\times4 - 2\times3 = 4 - 6 = -2$ //

$A^{-1} = \frac{\begin{pmatrix} 4 & -3 \\ -2 & 1 \end{pmatrix}}{\det(A)} = \frac{\begin{pmatrix} 4 & -3 \\ -2 & 1 \end{pmatrix}}{-2} = \begin{pmatrix} -2 & 3/2 \\ 1 & -1/2 \end{pmatrix}$

---

(8) $A = \begin{pmatrix} 1 & 2 \\ 3 & x \end{pmatrix}$ $A^{-1} = \begin{pmatrix} 4 & -1 \\ -3/2 & 1/2 \end{pmatrix}$ $\det(A) = 1\times x - 2\times3 = x - 6$

$\frac{1}{2} = \frac{1}{\det(A)}$ $\det(A) = 2 = x - 6$

$x = 2 + 6 = 8$ // $x = 8$ //

(9) $\log_{10}(x^2+10x+25)=2$

$x^2+10x+25=(x+5)^2$

$\log_{10}(x+5)^2=2$

$2\log_{10}|x+5|=2$

$\log_{10}|x+5|=1$

$|x+5|=10^1$

$x+5=10$ or $-x-5=10$

$x=5$ // or $x=-15$ //

$x^2+10x+25=10^2=100$

$x^2+10x-75=0$

$x^2+15x-5x-75=0$

$x(x+15)-5(x+15)=0$

$(x+15)(x-5)=0$

$x+15=0$ or $x-5=0$

$x=-15$ // or $x=5$ //

---

(10) $\log_2\left(\frac{3x+1}{2x+1}\right)=2$

$\frac{3x+1}{2x+1}=2^2=4$

$3x+1=4(2x+1)$

$3x+1=8x+4$

$8x-3x=1-4$

$5x=-3$

$x=-3/5$ //

---

(11) $\log_2\left(\frac{x+1}{x}\right)=1$

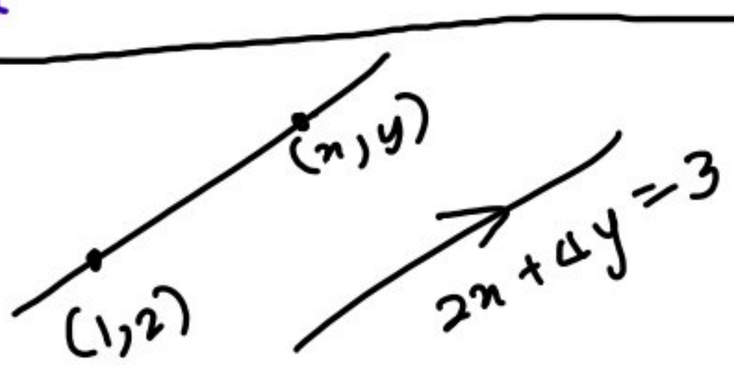
$\frac{x+1}{x}=2^1=2$

$x+1=2x$

$x=1$ //

---

(12)



equation of a parrell line)

$2x+4y=k$

$2\times1+4\times2=k$

$2+8=k$

$k=10$

$2x+4y=10$

$2y+x=5$ //

$y=mx+c$

$2x+4y=3$

$4y=-2x+3$

$y=-\frac{1}{2}x+\frac{3}{4}$

$m=-\frac{1}{2}$

$\frac{y-2}{x-1}=-\frac{1}{2}$

$2(y-2)=-1(x-1)$

$2y-4+x-1=0$

$2y+x-5=0$

$2y+x=5$ //

(13) $x^2+3x+4=8$

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

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

$x(x+4)-1(x+4)=0$

$(x+4)(x-1)=0$

$x+4=0$ or $x-1=0$

$x=-4$ // or $x=1$ //

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

$a=1$, $b=3$, $c=-4$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-3\pm\sqrt{3^2-4\times1(-4)}}{2\times1}$

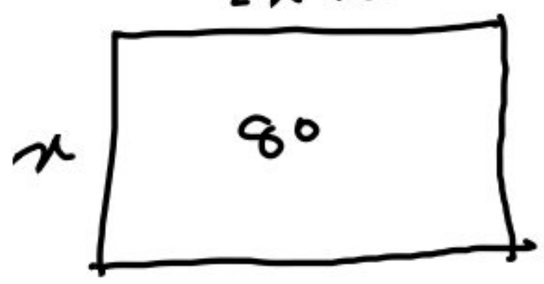
$x=\frac{-3\pm\sqrt{25}}{2}=\frac{-3\pm5}{2}$

$x=\frac{-3+5}{2}$ or $x=\frac{-3-5}{2}$

$x=1$ // or $x=-4$ //

---

(14)



Area $=x(2x+2)=80$

$2x^2+2x=80$

$x^2+x=40$

$x^2+x-40=0$

$a=1$, $b=1$, $c=-40$

$x=\frac{-1\pm\sqrt{1^2-4\times1(40}}{2\times1}$

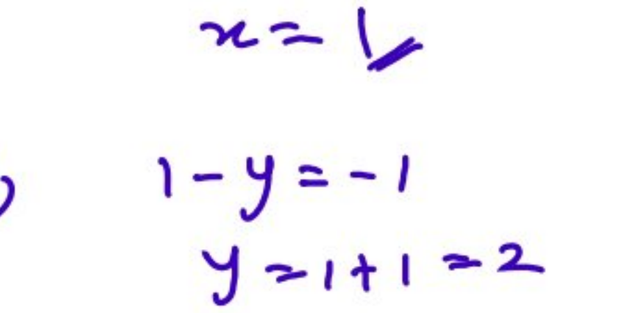
$x=\frac{-1\pm\sqrt{161}}{2}$

$x>0$

$x=\frac{\sqrt{161}-1}{2}$ //

---

(15)



Arch length $=S=r\theta$

$=4\text{ inch}\left(\frac{125}{180}\times\pi\right)$

$=\frac{\cancel{4}^{1}\times\cancel{125}^{25}}{\cancel{180}_{45}}\pi$ $=\frac{25\pi}{9}$ inch //

---

(16) $3x+2y=7$ —①

$x-y=-1$ —②

②$\times2$ $2x-2y=-2$ —③

①+③ $3x+2y+2x-2y=7-2$

$5x=5$

$x=1$ /

②) $1-y=-1$

$y=1+1=2$

$\left.\begin{matrix}x=1\\y=2\end{matrix}\right\}$ //

(17) $\int (x^2+3)^2 dx = \int (x^4+6x^2+9)dx$

$= \frac{x^{4+1}}{4+1} + 6\frac{x^{2+1}}{2+1} + 9x + C = \frac{x^5}{5} + 2x^3 + 9x + C$ //

---

(18) $\int (x^2+3x+1)^2 dx$

$(x^2+3x+1)^2 = x^4 + (3x)^2 + 1^2 + 2x^2 + 3x + 2x^2 \times 1 + 2 \times 3x \times 1$

$= x^4 + 9x^2 + 1 + 6x^3 + 2x^2 + 6x$

$= x^4 + 6x^3 + 11x^2 + 6x + 1$

$= \int (x^4+6x^3+11x^2+6x+1)dx$

$= \frac{x^5}{5} + \frac{6x^4}{4} + \frac{11x^3}{3} + \frac{6x^2}{2} + x + C$

$= \frac{x^5}{5} + \frac{3x^4}{2} + \frac{11x^3}{3} + 3x^2 + x + C$ //

---

(19) $y = (2x^2-3x+4)(x^3-x^2+5)$

$\frac{dy}{dx} = (2x^2-3x+4)(3x^2-2x) + (x^3-x^2+5)(4x-3)$ //

$= 6x^4 - 9x^3 + 12x^2 - 4x^3 + 6x^2 - 8x + 4x^4 - 4x^3 + 20x - 3x^3 + 3x^2 - 15$

$= 10x^4 - 20x^3 + 21x^2 + 12x - 15$ //

---

(20) $y = \sqrt[4]{x^2+3x}$

$u = x^2 + 3x$ $\qquad y = u^{1/4}$

$\frac{du}{dx} = 2x + 3$ $\qquad \frac{dy}{du} = \frac{1}{4}u^{1/4-1} = \frac{u^{-3/4}}{4}$

$\frac{dy}{dx} = \left(\frac{dy}{du}\right)\left(\frac{du}{dx}\right)$

$\frac{dy}{dx} = \left(\frac{u^{-3/4}}{4}\right)(2x+3) = \frac{(2x+3)}{4}(x^2+3x)^{-3/4} = \frac{(2x+3)}{4(x^2+3x)^{3/4}}$ //

---

(21) $y = \frac{1}{(x^2-3x+4)^{1/3}}$

$u = x^2 - 3x + 4$ $\qquad y = \frac{1}{u^{1/3}} = u^{-1/3}$

$\frac{du}{dx} = 2x - 3$ $\qquad \frac{dy}{du} = -\frac{1}{3}u^{-\frac{1}{3}-1} = -\frac{u^{-4/3}}{3}$

$$\frac{dy}{dx} = \left(\frac{dy}{du}\right)\left(\frac{du}{dx}\right) = \left(\frac{-u^{-4/3}}{3}\right)(2x-3)$$

$$= -\frac{(x^2-3x+4)^{-4/3}}{3}(2x-3) = \frac{(3-2x)}{3(x^2-3x+4)^{4/3}} \quad //$$

---

(22) $y = \dfrac{1}{(x^2-3)^{-2/3}} = (x^2-3)^{2/3}$

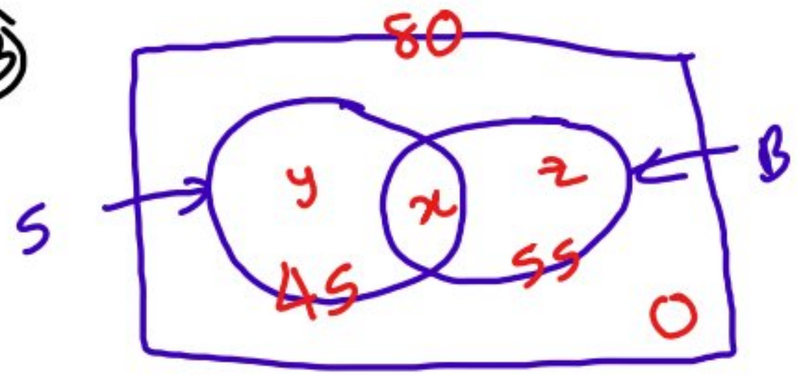
$u = x^2-3$ $\qquad y = u^{2/3}$

$\dfrac{du}{dx} = 2x$ $\qquad \dfrac{dy}{du} = \dfrac{2}{3}u^{2/3-1} = \dfrac{2}{3}u^{-1/3}$

$$\frac{dy}{dx} = \left(\frac{dy}{du}\right)\left(\frac{du}{dx}\right) = \left(\frac{2}{3}u^{-1/3}\right)2x = \frac{4x}{3}(x^2-3)^{-1/3} = \frac{4x}{3(x^2-3)^{1/3}} \quad //$$

---

(23)



$x+y = 45$ $\qquad x+z = 55$

$x+y+z = 80$

$x+y+x+z = 45+55$

$(x+y+z)+x = 45+55$

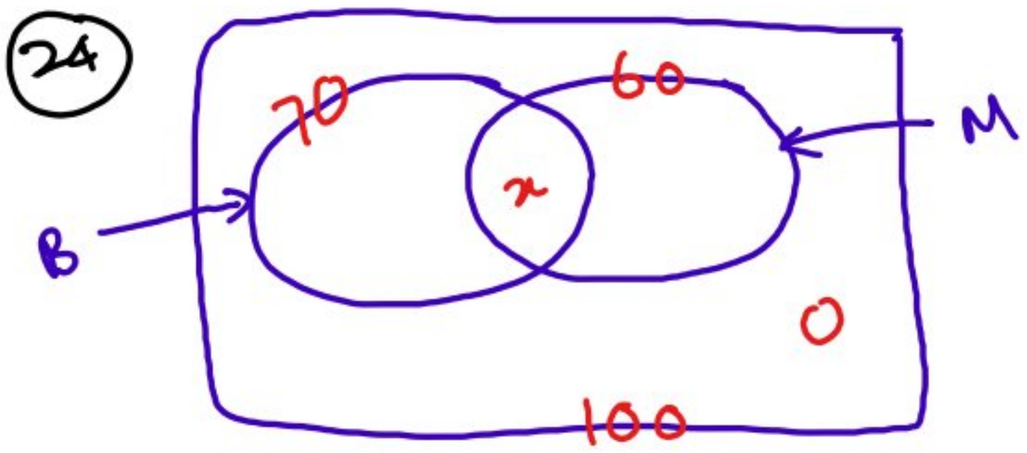
$80+x = 45+55$

$x = 100-80$

$x = 20$ //

---

(24)



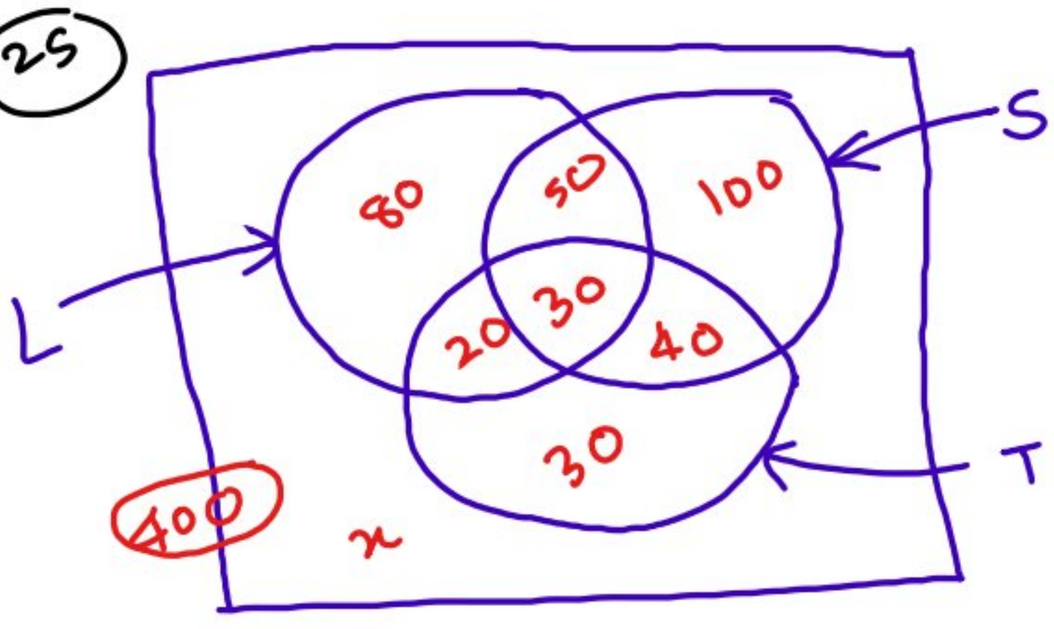
$60+70 = 100+x$

$x = 130-100$

$x = 30$

---

(25)



$n(L) = 180$ $\qquad n(S) = 220$ $\qquad n(T) = 120$

$n(L \cap S) = 80$ $\qquad n(S \cap T) = 70$ $\qquad n(L \cap T) = 50$

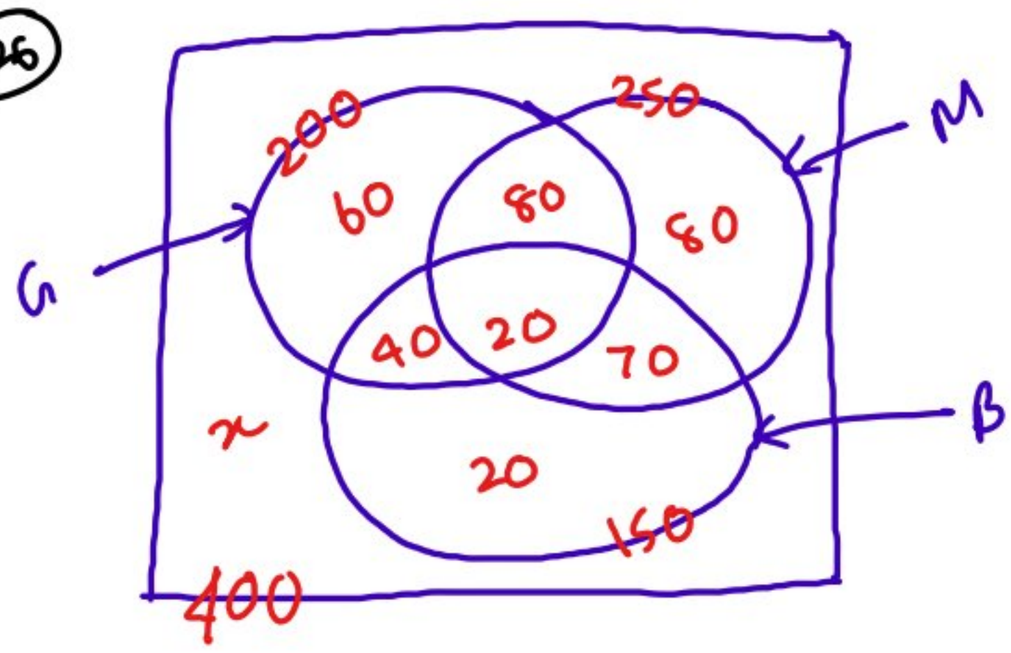
$n(L \cap S \cap T) = 30$

$x + 220 + 80 + 20 + 30 = 400$

$x + 350 = 400$

$x = 50$ //

(26)



$x + 250 + 60 + 40 + 20 = 400$

$x + 370 = 400$

$x = 30$ //

---

(27) $f(x) = 3x + 4$

$g(x) = 2x^2 + 3x + 4$

$f(g(x)) = 3(2x^2 + 3x + 4) + 4 = 6x^2 + 9x + 12 + 4 = 6x^2 + 9x + 16$ //

$g(f(x)) = 2(3x + 4)^2 + 3(3x + 4) + 4 = 2(9x^2 + 24x + 16) + 9x + 12 + 4$

$= 18x^2 + 48x + 32 + 9x + 16$

$= 18x^2 + 57x + 48$ //

---

(28) $f(x) = x + 1$ $\quad g(x) = \frac{3x+5}{x-1}$

$f(g(x)) = \frac{3x+5}{x-1} + 1 = \frac{3x + 5 + x - 1}{x-1} = \frac{4x+4}{x-1} = \frac{4(x+1)}{x-1}$ //

$g(f(x)) = \frac{3(x+1)+5}{x+1-1} = \frac{3x+3+5}{x} = \frac{3x+8}{x} = 3 + \frac{8}{x}$ //

---

(29) $f(x) = 5x - 7$

$y = 5x - 7$

$5x = y + 7$

$x = \frac{y+7}{5}$

$f^{-1}(x) = \frac{x+7}{5}$

---

(30) $f(x) = 3x + 4$

$y = 3x + 4$

$3x = y - 4$

$x = \frac{y-4}{3}$

$f^{-1}(x) = \frac{x-4}{3}$ //

(31) $f(x) = \frac{3x+1}{x-1}$

$y = \frac{3x+1}{x-1}$

$y(x-1) = 3x+1$

$yx - y = 3x+1$

$yx - 3x = y+1$

$x(y-3) = y+1$

$x = \frac{y+1}{y-3}$

$f^{-1}(x) = \frac{x+1}{x}$ //

---

(32) 50 oooooo

reduced by 20% $= 80\%$ of orginal weight

$w \rightarrow \frac{80}{100} w = \frac{4w}{5}$

average = 150 g

S.D = 10 g

multiply all by k

average $= \mu$, S.D $= \sigma$ → new average $= k\mu$, new S.D $= k\sigma$

new average $= \frac{4}{5} \times 150\,g = 120\,g$ //

new standard deviation $= \frac{4}{5} \times 10\,g = 8\,g$ //

---

(33) 80 - - - - - - .

average = 75

S.D = 5

increased by 10

new average

new S.D

increase all by k (adding k to all)

average $= \mu$, S.D $= \sigma$ → new average $= \mu + k$, new S.D $= \sigma$

new average $= 75 + 10 = 85$ //

new standard deviation $= 5$ //