IX <u>H.W-5</u>

1) Represent $\sqrt{5}$ on the number line.

2) Find the value of $\dfrac{3^{40}+3^{39}+3^{38}}{3^{41}+3^{40}-3^{39}}$

3) Simplify (i) $\sqrt{50}-\sqrt{98}+\sqrt{162}$

(ii) $\sqrt[4]{16}-6\cdot\sqrt[3]{343}+18\sqrt[5]{243}-\sqrt{196}$

4) Find the value of $\left(1^3+2^3+3^3\right)^{-\frac{3}{2}}$

5) Simplify $\left(\frac{1}{2}\right)^{-2}+\left(\frac{2}{3}\right)^{-2}+\left(\frac{3}{4}\right)^{-2}$

6) Simplify $\left(\dfrac{x^a}{x^b}\right)^{a+b}\times\left(\dfrac{x^b}{x^c}\right)^{b+c}\times\left(\dfrac{x^c}{x^a}\right)^{c+a}$

7) If $a=2+\sqrt{5}$ and $b=\frac{1}{a}$, find a^2+b^2

8) If $x=3-2\sqrt{2}$, find the value of $\sqrt{x}+\frac{1}{\sqrt{x}}$

9) If $\sqrt{2}=1.414$, then find the value of $\frac{1}{\sqrt{2}+1}$

10) If $x=4-\sqrt{15}$, then find the value of $\left(x+\frac{1}{x}\right)^2$

11) If $x=\dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$; $y=\dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, find x^2+y^2

12) Prove that $\dfrac{1}{3+\sqrt{7}}+\dfrac{1}{\sqrt{7}+\sqrt{5}}+\dfrac{1}{\sqrt{5}+\sqrt{3}}+\dfrac{1}{\sqrt{3}+1}=1$

13) Find the values of a and b when $\dfrac{5+\sqrt{6}}{5-\sqrt{6}}=a+b\sqrt{6}$

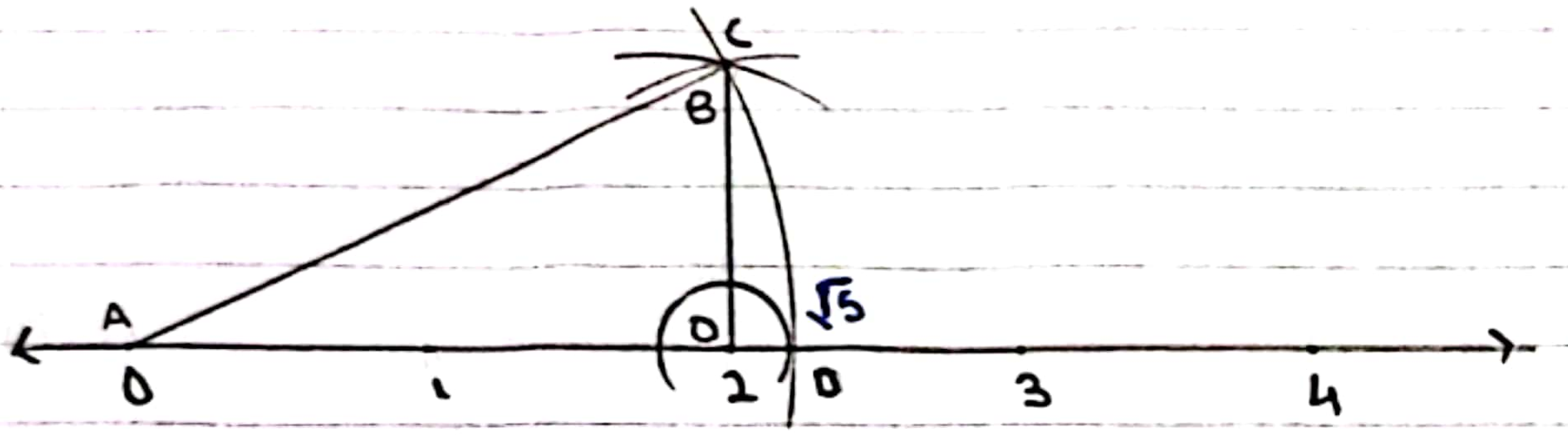
14) If $f(x)=x^2-5x+7$, evaluate $f(2)+f\left(\frac{1}{3}\right)-f(-1)$

15) Verify if 1 and -3 are zeroes of the polynomial $3x^3+5x^2-11x+3$.

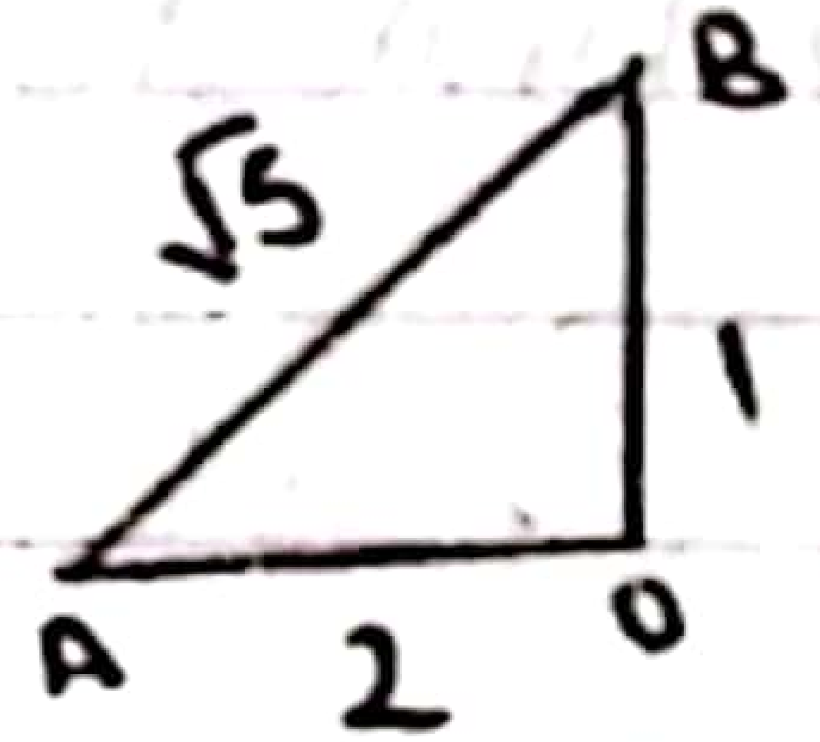
16) Find the value of K so that x^3+3x^2-Kx-3 has -3 as a ~~factor~~ zero.

Homework V

1)



D represents $\sqrt{5}$ on the number line.



Acc. to Pythagoras theorem.

$AO^2 + BO^2 = AB^2$

$2^2 + 1^2 = AB^2$

$4 + 1 = AB^2$

$\therefore AB = \sqrt{5}$

H.W-5 answers

1) Construction

2) $\dfrac{3^{40}+3^{39}+3^{38}}{3^{41}+3^{40}-3^{39}} = \dfrac{\cancel{3^{38}}\,(3^{2}+3^{1}+1)}{\cancel{3^{38}}\,(3^{3}+3^{2}-3)} = \dfrac{9+3+1}{27+9-3} = \dfrac{13}{33}$

3) (i) $\sqrt{50}-\sqrt{98}+\sqrt{162}$

$= 5\sqrt{2}-7\sqrt{2}+9\sqrt{2}$

$= 7\sqrt{2}$

(ii) $\sqrt[4]{16}-6\sqrt[3]{343}+18\sqrt[5]{243}-\sqrt{196}$

$= 2^{4\times\frac{1}{4}} - 6\times 7^{3\times\frac{1}{3}} + 18\times 3^{5\times\frac{1}{5}} - 14$

$= 2-6\times7+18\times3-14$

$= 2-42+54-14$

$= 56-56 = 0$

4) $(1^{3}+2^{3}+3^{3})^{-\frac{3}{2}} = (1+8+27)^{-\frac{3}{2}} = 36^{-\frac{3}{2}} = 6^{2\times-\frac{3}{2}} = 6^{-3} = \dfrac{1}{6^{3}} = \dfrac{1}{216}$

5) $\left(\dfrac{1}{2}\right)^{-2}+\left(\dfrac{2}{3}\right)^{-2}+\left(\dfrac{3}{4}\right)^{-2} = 2^{+2}+\left(\dfrac{3}{2}\right)^{2}+\left(\dfrac{4}{3}\right)^{2}$

$= 4^{\times 36} + \dfrac{9\times9}{4\times9} + \dfrac{16\times4}{9\times4}$

$= \dfrac{144+81+64}{36} = \dfrac{289}{36}$

6) $\left(\dfrac{x^{a}}{x^{b}}\right)^{a+b}\times\left(\dfrac{x^{b}}{x^{c}}\right)^{b+c}\times\left(\dfrac{x^{c}}{x^{a}}\right)^{c+a}$

$= \left(x^{a-b}\right)^{a+b}\times\left(x^{b-c}\right)^{b+c}\times\left(x^{c-a}\right)^{c+a}$

$= x^{a^2-b^2}\times x^{b^2-c^2}\times x^{c^2-a^2}$

$= x^{\cancel{a^2}-\cancel{b^2}+\cancel{b^2}-\cancel{c^2}+\cancel{c^2}-\cancel{a^2}}$

$= x^{0} = 1$

7) $a = 2+\sqrt{5}$

$b = \frac{1}{a} = \frac{1}{2+\sqrt{5}} = \frac{2-\sqrt{5}}{2^2-(\sqrt{5})^2} = \frac{2-\sqrt{5}}{4-5} = \frac{2-\sqrt{5}}{-1} = -(2-\sqrt{5})$

$a^2 = (2+\sqrt{5})^2 = 4+5+4\sqrt{5} = 9+4\sqrt{5}$

$b^2 = \left[-(2-\sqrt{5})\right]^2 = (2-\sqrt{5})^2 = 9-4\sqrt{5}$

$\therefore a^2+b^2 = 9+\cancel{4\sqrt{5}}+9-\cancel{4\sqrt{5}} = \underline{\underline{18}}$

8) $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2 = x+\frac{1}{x}+2$

$x = 3-2\sqrt{2}$

$\frac{1}{x} = \frac{1}{3-2\sqrt{2}} = \frac{3+2\sqrt{2}}{9-8} = 3+2\sqrt{2}$

$\therefore \left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2 = 3-\cancel{2\sqrt{2}}+3+\cancel{2\sqrt{2}}+2$

$= 8$

$\therefore \sqrt{x}+\frac{1}{\sqrt{x}} = \sqrt{8} = \underline{\underline{2\sqrt{2}}}$

9) $\frac{1}{\sqrt{2}+1} = \frac{\sqrt{2}-1}{2-1} = \sqrt{2}-1 = 1.414-1 = \underline{\underline{0.414}}$

10) $x = 4-\sqrt{15}$

$\frac{1}{x} = \frac{1}{4-\sqrt{15}} = \frac{4+\sqrt{15}}{16-15} = 4+\sqrt{15}$

$\therefore \left(x+\frac{1}{x}\right)^2 = \left(4-\cancel{\sqrt{15}}+4+\cancel{\sqrt{15}}\right)^2 = 8^2 = 64$

11) $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{(\sqrt{3}+\sqrt{2})^2}{3-2} = 3+2+2\sqrt{6} = 5+2\sqrt{6}$

$y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} = \frac{(\sqrt{3}-\sqrt{2})^2}{3-2} = \frac{3+2-2\sqrt{6}}{1} = 5-2\sqrt{6}$

$\therefore x^2+y^2 = (5+2\sqrt{6})^2+(5-2\sqrt{6})^2$

$= 25+24+\cancel{20\sqrt{6}}+25+24-\cancel{20\sqrt{6}}$

$= \underline{\underline{98}}$

12) LHS, $\frac{3-\sqrt{7}}{9-7}+\frac{\sqrt{7}-\sqrt{5}}{7-5}+\frac{\sqrt{5}-\sqrt{3}}{5-3}+\frac{\sqrt{3}-1}{3-1}$

$=\frac{3-\sqrt{7}}{2}+\frac{\sqrt{7}-\sqrt{5}}{2}+\frac{\sqrt{5}-\sqrt{3}}{2}+\frac{\sqrt{3}-1}{2}$

$=\frac{3-\cancel{\sqrt{7}}+\cancel{\sqrt{7}}-\cancel{\sqrt{5}}+\cancel{\sqrt{5}}-\cancel{\sqrt{3}}+\cancel{\sqrt{3}}-1}{2}=\frac{2}{2}=\underline{\underline{1}}$, RHS

13) $\frac{(5+\sqrt{6})^2}{25-6}=\frac{25+6+10\sqrt{6}}{19}=\frac{31+10\sqrt{6}}{19}=\frac{31}{19}+\frac{10\sqrt{6}}{19}$

$\therefore\ a=\frac{31}{19}$

$b=\frac{10}{19}$

14) $f(x)=x^2-5x+7$

$f(2)=4-10+7=11-10=1$

$f\left(\frac{1}{3}\right)=\frac{1}{9}-\frac{5^{\times 3}}{3_{\times 3}}+7^{\times 9}=\frac{1-15+63}{9}=\frac{49}{9}$

$f(-1)=1+5+7=13$

$\therefore\ f(2)+f\left(\frac{1}{3}\right)-f(-1)=1+\frac{49}{9}-13=\frac{49}{9}-12$

$=\frac{49-108}{9}=-\underline{\underline{\frac{59}{9}}}$

15) Let $p(x)=3x^3+5x^2-11x+3$

$p(1)=3+5-11+3=11-11=0$

$p(-3)=3\times-27+5\times 9+11\times 3+3$

$=-81+45+33+3$

$=-81+81=0$

$\therefore$ 1 and -3 are zeroes of $p(x)$

16) Since -3 is a zero of $p(x)=x^3+3x^2-kx-3$, then

$p(-3)=0$

$\Rightarrow(-3)^3+3(-3)^2-k(-3)-3=0$

$\Rightarrow\cancel{-27}+\cancel{27}+3k-3=0$

$3k=3$

$\underline{\underline{k=1}}$