Daffodil International University

Assignment

Course Title: BASIC MATHEMATICS

Course Code: MAT-111

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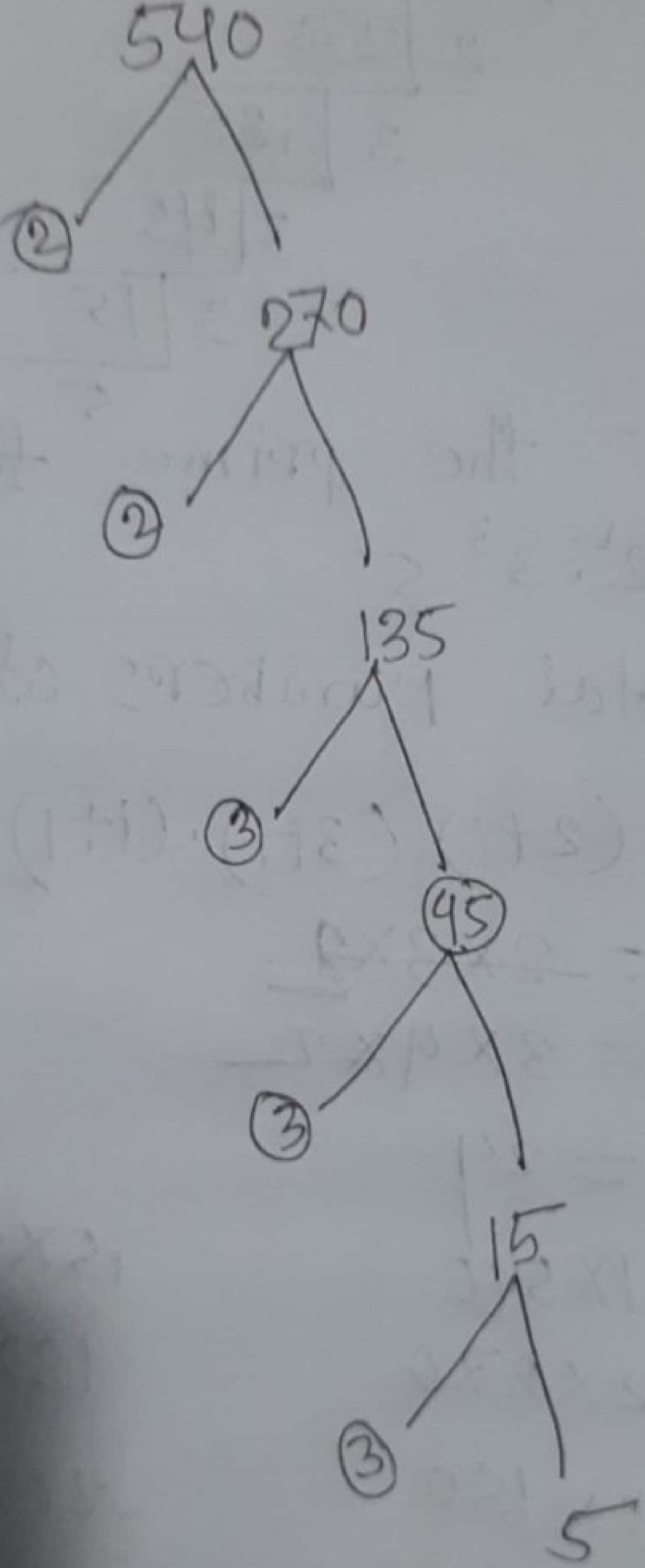
2. Find the prime factorization of 540 usi
tree.

Solve:



Therefore,
The prime factorization of 540
is $= 2 \times 2 \times 3 \times 3 \times 3 \times 5$
$= 2^2 \cdot 3^3 \cdot 5$

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3. Find out the factors of 540

Solve:

$$\begin{array}{r|l} 2 & 540 \\ \hline 2 & 270 \\ \hline 3 & 135 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline & 5 \end{array}$$

Therefore the prime factorization 540 is $= 2^2 \cdot 3^3 \cdot 5$

So the total Numbers of factors of 540

$= (2+1)(3+1)\cdot(1+1)$

$= \cancel{2 \times 3 \times 2}$

$= 3 \times 4 \times 2$

$= 24$

Here,

$540 = 1 \times 540$

$= 2 \times 270$

$= 3 \times 180$

$= 4 \times 135$

$= 5 \times 108$

$= 6 \times 90$

$= 9 \times 90$

$= 10 \times 54$

$= 12 \times 45$

15×36

18×30

20×27

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The all factor of 540 are = 1, 2, 3, 4, 5, 6, 9, 10, 12
15, 18, 20, 27, 30, 36, 45
54, 60, 90, 108, 135, 180, 270,
540 (Ans)

4. what is the GCD and LCM of 240 and 540

Solve: Division Method.

$$\begin{array}{r|l} 2 & 240 \\ 2 & 120 \\ 2 & 60 \\ 2 & 30 \\ 3 & 15 \\ & 5 \end{array} \qquad \begin{array}{r|l} 2 & 540 \\ 2 & 270 \\ 3 & 135 \\ 3 & 45 \\ 3 & 15 \\ & 5 \end{array}$$

Therefore, the prime factorzation of 240 = $2^2 \cdot 3 \cdot 5$

Therefore, the prime factorzation of 540 = $2^2 \cdot 3^3$

$$L.C.M \text{ of } (240, 540) = 2^4 \cdot 3^3 \cdot 5$$
$$= 2160 \text{ (Ans)}$$

$$G.C.D \text{ of } (240, 540) = 2^2 \cdot 3 \cdot 5$$
$$= 60 \text{ (Ans)}$$

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5. Find the HCF and LCM of 42, 63 and 1

Solve: Here,

$42 = 2 \times 21 = 2 \times 3 \times 7 = 2^1 \times 3^1 \times 7^1$

$63 = 3 \times 21 = 3 \times 3 \times 7 = 3^2 \cdot 7^1$

$140 = 2 \times 270 = 2 \times 2 \times 35$

$= 2^2 \cdot 5 \cdot 7$

L.C.M of 42, 63, and 140 $= 2^2 \cdot 3^2 \cdot 5 \cdot 7$

$= 1260$

HCF of 42, 60 and 140 $= 7$ (Ans)

6. Find the HCF and L.C.M 2/3, 8/9, 16/81, and

Solve

Calcation of Numbertor

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2^1 \times 5^1$

LCM of Number

$= 2^4 \cdot 5 = 80$

HCF of Numbertor $= 2$.

Calcultion for Denomin

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

LCM of Denominator

$3^4 = 81$

HCF of " $= 3$

$\therefore$ LCM of (2/3, 8/9, 16/81 and 10/27) $= 80/3$

$\therefore$ HCF of (2/3, 8/9, 16/81, and 16/27) $= 2/81$

7. Find the modulus and Argument of $z = \frac{1+\sqrt{3}i}{1-\sqrt{3}i}$ a also its polar, exponetial from.

Solve: we have,

$$z = \frac{1+\sqrt{3}i}{1-\sqrt{3}i}$$

$$= \frac{(1+\sqrt{3}i)\ (1+\sqrt{3}i)}{(1-\sqrt{3}i)\ (1+\sqrt{3}i)}$$

$$= \frac{1+2\sqrt{3}i+(\sqrt{3})^2 \cdot i^2}{(1)^2-(\sqrt{3}i)^2}$$

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

$$= \frac{2\sqrt{3}i-2}{4}$$

$$= \frac{2\sqrt{3}i}{4} - \frac{2}{4}$$

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

Let $z = -1/2 + \frac{\sqrt{3}}{2}i$

$|z| = \sqrt{(-1/2)^2+(\sqrt{3}/2)^2}$

$= \sqrt{1/4+3/4}$

$= \sqrt{1}$

$= 1$

$\therefore$ Modules z is $= 1$

where,

$x = -1/2$

and $y = \sqrt{3}/2$

And Argument of z is $\theta = \pi - \tan^{-1}\left(\frac{\sqrt{3}/2}{-1/2}\right)$

$$= \pi - \tan^{-1}(-\sqrt{3})$$

$$= \pi - \tan^{-1}(\sqrt{3})$$

$$= \pi - 60^\circ$$

$$= \pi - \pi/3$$

$$= \frac{2\pi}{3}$$

polar from,

$$z = r(\cos\theta + i\sin\theta)$$

$$= 1(\cos 2\pi/3 + i\sin 2\pi/3)$$

$$= \cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}$$

Exponential from is $= re^{i\theta}$

$$= 1\cdot e^{\frac{2\pi}{3}i}$$

$$= e^{2\pi/3}$$

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8) Evatate $\sqrt{-16} \times \sqrt{-4}$ and $\sqrt{-16}/\sqrt{-4}$

solve:

$\sqrt{-16} \times \sqrt{-4}$

$= i\sqrt{-16} \times i\sqrt{-4}$

$= 4i \times 2i$

$= 8i^2$

$= -8$ (Ans)

and

$\frac{\sqrt{-16}}{\sqrt{-4}}$

$= \frac{i\sqrt{16}}{i\sqrt{4}}$

$= \frac{4i}{2i}$

$= 2$ (Ans)

9) Evatate Modulos and Argument of $8z - z^2$ by replacing $z = 2+i$

solve: Here given that

$z = 2+i$

$\therefore 8z - z^2 = 8(2+i) - (2+i)^2$

$= 16 + 8i - (4 + 4i + i^2)$

$= 16 + 8i - 4 - 4i - i^2$

$= 16 + 8i - 4 - 4i + 1$

$= \cancel{29}$ $= 13 + 4i$ so, $x = 13$ and $Y = 4$

Therefore,

Modulos, $|z| = \sqrt{x^2 + y^2}$

$= \sqrt{(13)^2 + (4)^2}$

$= \sqrt{169 + 16}$

$= \sqrt{185}$

Argument

$\theta = \tan^{-1}(Y/x)$

$= \tan^{-1} 4/13$

$= 17.10°$

10. Express $1+\sqrt{3}i$ in the from of $r(\cos\theta+i$

Solve: Here,

$$z = 1+\sqrt{3}i$$

$$\therefore |z| = \sqrt{(1)^2+(\sqrt{3})^2}$$

$$= \sqrt{4}$$

$$= 2$$

$$\therefore \text{Argument } \theta = \tan^{-1} \sqrt{3}/1$$

$$= \tan^{-1}\sqrt{3}$$

$$= \tan^{-1} 60^\circ$$

$$= \pi/3$$

therefore $r=(\cos\theta + i\sin\theta)$ form is

$$= 2(\cos\pi/3 + i\sin\pi/3) \text{ Ans}$$

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