



## DPP - 3

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Evaluate each of the following :

1.(a)  $3^4$

Ans. 81

(b)  $(-2x)^3$

Ans.  $-8x^3$

Sol.  $= (-2)^3(x)^3$   
 $= -8x^3$

(c)  $\left(\frac{3y}{4}\right)^3$

Ans.  $\frac{27y^3}{64}$

Sol.  $= \frac{3^3y^3}{4^3}$

$$= \frac{27y^3}{64}$$

(d)  $4^{-3}$

Ans.  $\frac{1}{64}$

Sol.  $= \frac{1}{4^3} = \frac{1}{64}$

(e)  $(-4x)^{-2}$

Ans.  $\frac{1}{16x^2}$

Sol.  $= \frac{1}{(-4x)^2} = \frac{1}{(-4)^2(x)^2}$

$$= \frac{1}{16x^2}$$

(f)  $(2y^{-1})^{-1}$

Ans.  $\frac{y}{2}$

Sol.  $= 2^{-1}(y^{-1})^{-1}$

$$= \frac{1}{2} y^1 = \frac{y}{2}$$

(g)  $\frac{3^{-1}x^2y^{-4}}{2^{-2}x^{-3}y^3}$

Ans.  $\frac{4x^5}{3y^7}$

Sol.  $\frac{2^2}{3^1} \cdot x^2 \cdot x^3 \cdot \frac{1}{y^3y^4}$

$$= \frac{4}{3} \cdot \frac{x^5}{y^7}$$

(h)  $(16)^{1/4}$

Ans. 2

Sol.  $= (2^4)^{1/4}$

$$= 2^1$$

(i)  $\frac{8^{-2/3}(-8)^{2/3}}{8^{1/3}}$

Ans.  $\frac{1}{2}$

Sol.  $\frac{(-8)^{2/3}}{(8)^{2/3}} \cdot \frac{1}{8^{1/3}} = \left(\frac{-8}{8}\right)^{2/3} \cdot \frac{1}{(2^3)^{1/3}}$

$$= (-1)^{2/3} \frac{1}{2} = \frac{1}{2}$$

(j)  $(-a^3b^3)^{-\frac{2}{3}}$

Ans.  $\frac{1}{a^2b^2}$

Sol.  $= \frac{1}{(-a^3b^3)^{2/3}} = \frac{1}{(-1)^{2/3}(a^3)^{2/3} \cdot (b^3)^{2/3}}$

$$= \frac{1}{1 \cdot a^2 \cdot b^2} = \frac{1}{a^2b^2} = 1$$



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(k)  $-3(-1)^{-\frac{1}{5}}(4)^{-\frac{1}{2}}$

(l)  $(10^3)^0$

Ans.  $\frac{3}{2}$

Ans. 1

Sol.  $\frac{(-3)}{(-1)^{1/5}} \cdot \frac{1}{4^{1/2}}$

Sol. = 1

$$\frac{-3}{-1} \cdot \frac{1}{(2^2)^{1/2}} = \frac{3}{2}$$

(m)  $(x - y)^0[(x - y)^4]^{-1/2}, x \neq y$

(n)  $x^y x^{4y}$

Ans.  $\frac{1}{(x-y)^2}$

Ans.  $x^{5y}$

Sol.  $\frac{1}{[(x-y)^4]^{1/2}} = \frac{1}{[(x-y)^2]^{1/2}}$

Sol.  $= x^{y+4y} = x^{5y}$

$$= \frac{1}{(x-y)}$$

(o)  $3y^{2/3}y^{4/3}$

(p)  $(4 \cdot 10^3)(3 \cdot 10^{-5})(6 \cdot 10^4)$

Ans.  $3y^2$

Ans. 7200

Sol.  $3 \cdot y^{\frac{2}{3} + \frac{4}{3}}$

Sol.  $72 \cdot 10^{3-5+4}$

$$3y^2$$

$$72 \cdot 10^2 = 7200$$

2. (a)  $\frac{2^3 \cdot 2^{-2} \cdot 2^4}{2^{-1} \cdot 2^0 \cdot 2^{-3}}$

(b)  $\frac{10^{x+y} \cdot 10^{y-x} \cdot 10^{y+1}}{10^{y+1} \cdot 10^{2y+1}}$

Ans.  $2^9$

Ans.  $\frac{1}{10}$

Sol.  $\frac{2^3 \cdot 2^1 \cdot 2^4 \cdot 2^3}{2^2 2^0} = \frac{2^{11}}{2^2} = 2^9$

Sol.  $10^{x+y+y-x-2y-1} = 10^{-1} = \frac{1}{10}$

(c)  $\frac{3^{1/2} \cdot 3^{-2/3}}{3^{-1/2} \cdot 3^{1/3}}$

(d)  $\frac{(x+y)^{2/3}(x+y)^{-1/6}}{[(x+y)^2]^{1/4}}$

Ans. 1

Ans. 1

Sol.  $\frac{3^{1/2} \cdot 3^{1/2}}{3^{2/3} 3^{1/3}} = \frac{3^1}{3^1} = 1$

Sol.  $= \frac{(x+y)^{2/3} \cdot (x+y)^{-1/6}}{(x+y)^{1/2}}$

$$(x+y)^{\frac{2}{3}-\frac{1}{6}-\frac{1}{2}} = (x+y)^0 = 1$$



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(e)  $\frac{(10^2)^{-3}(10^3)^{1/6}}{\sqrt{10} \cdot (10^4)^{-1/2}}$

Ans.  $10^{-4}$

Sol.  $\frac{10^{-6} \cdot 10^{\frac{1}{2}}}{10^{\frac{1}{2}} 10^{-2}} = 10^{-4}$

(g)  $\frac{4^{-1/2} a^{2/3} b^{-1/6} c^{-3/2}}{8^{2/3} a^{-1/3} b^{-2/3} c^{5/2}}$

Ans.  $\frac{a\sqrt{b}}{8c^4}$

Sol.  $\frac{a^{2/3} a^{1/3} b^{2/3} b^{-1/6}}{4^{1/2} \cdot 8^{2/3} c^{5/2} c^{3/2}}$

$$\frac{ab^{1/2}}{8c^4} = \frac{a\sqrt{b}}{8c^4}$$

(i)  $\sqrt[4]{a^2} \sqrt[3]{b^5} \over \sqrt{c^{-2} d^2}$

Ans.  $\frac{a^{1/4} b^{5/6} c}{d}$

Sol.  $= \sqrt{\frac{(a^2)^{1/4} (b^5)^{1/3}}{c^{-2} d^2}} = \frac{(a^{1/2})^{1/2} (b^{5/3})^{1/2}}{(c^{-2})^{1/2} (d^2)^{1/2}} = \frac{a^{1/4} b^{5/6}}{c^{-1} d} = \frac{a^{1/4} b^{5/6} c}{d}$

3. (a)  $\sqrt{27^{-2/3}} + 5^{2/3} \cdot 5^{1/3}$

Ans.  $\frac{16}{3}$

Sol.  $[(3^3)^{-2/3}]^{1/2} + 5^{\frac{2}{3}} + \frac{1}{3}$

$$3^{-1} + 5^1 = \frac{1}{3} + 5 = \frac{16}{3}$$

(c)  $8^{2/3} + 3^{-2} - \frac{1}{9} (10)^0$

Ans. 4

Sol.  $(2^3)^{2/3} + \frac{1}{3^2} - \frac{1}{9} (1)$

(f)  $[(x^{-1})^{-2}]^{-3}$

Ans.  $x^{-6}$

Sol.  $= x^{(-1) \cdot (-2) \cdot (-3)} = x^{-6}$

(h)  $\left(\frac{2^{-8} \cdot 3^4}{5^{-4}}\right)^{-1/4}$

Ans.  $\frac{4}{15}$

Sol.  $= \frac{(2^{-8})^{-1/4} (3^4)^{-1/4}}{(5^{-4})^{-1/4}} = \frac{2^2 3^{-1}}{5} = \frac{4}{15}$

(b)  $4 \left(\frac{1}{2}\right)^0 + 2^{-1} - (16)^{-1/2} \cdot 4 \cdot 3^0$

Ans.  $\frac{7}{2}$

Sol.  $4 + \frac{1}{2} - (4^2)^{-1/2} \cdot 4$

$$4 + \frac{1}{2} - \frac{1}{4} \cdot 4$$

$$4 + \frac{1}{2} - 1 = 4 - \frac{1}{2} = 7/2$$

(d)  $(27)^{2/3} - 3(3x)^0 + (25)^{1/2}$

Ans. 11

Sol.  $(3^3)^{2/3} - 3(1) + (5^2)^{1/2}$

$$3^2 - 3 + 5$$

$$4 + \frac{1}{9} - \frac{1}{9} = 4$$

$$9 - 3 + 5 = 11$$



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(e)  $(8)^{2/3} \cdot (16)^{-3/4} \cdot 2^0 - 8^{-2/3}$

(f)  $\sqrt[3]{(x-2)^{-2}}$  when  $x = -6$

Ans.  $\frac{1}{4}$

Ans.  $\frac{1}{4}$

Sol.  $(2^3)^{2/3} \cdot (2^4)^{-\frac{3}{4}} \cdot (1) - (2^3)^{-2/3}$

Sol.  $[(-6-2)^{-2}]^{1/3} = (-8)^{-2/3}$

$$\begin{aligned} & 2^2 \cdot 2^{-3} - 2^{-2} \\ & \frac{1}{(-2)^2} = \frac{1}{4} \end{aligned}$$

$$\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

(g)  $x^{3/2} + 4x^{-1} - 5x^0$  when  $x = 4$

(h)  $y^{2/3} + 3y^{-1} - 2y^0$  when  $y = 1/8$

Ans. 4

Ans.  $\frac{89}{4}$

Sol.  $4^{3/2} + 4 \cdot 4^{-1} - 5 \cdot 4^0$

Sol.  $\left(\frac{1}{8}\right)^{2/3} + 3\left(\frac{1}{8}\right)^{-1} - 2\left(\frac{1}{8}\right)^0$

$$(2^2)^{3/2} + 4 \cdot \frac{1}{4} - 5(1)$$

$$\left[\left(\frac{1}{2}\right)^3\right]^{2/3} + 3 \cdot (8) - 2$$

$$2^3 + 1 - 5$$

$$\frac{1}{4} + 24 - 2 = \frac{89}{4}$$

$$9 - 5 = 4$$

(i)  $64^{-2/3} \cdot 16^{5/4} \cdot 2^0 \cdot (\sqrt{3})^4$

(j)  $\frac{\sqrt{a} \cdot a^{-2/3}}{\sqrt[6]{a^5}} + \frac{a^{-5/6}}{\sqrt[3]{a^2 \cdot a^{-1/2}}}$

Ans. 18

Ans.  $\frac{2}{a}$

Sol.  $(4^3)^{-\frac{2}{3}} \cdot (2^4)^{\frac{5}{4}} \cdot (1) \cdot \left(3^{\frac{1}{2}}\right)^4$

Sol.  $\frac{a^{1/2}a^{-2/3}}{a^{5/6}} + \frac{a^{-5/6}}{(a^2)^{1/3}a^{-1/2}}$

$$4^{-2} \cdot 2^5 \cdot 3^2 = \frac{1}{16} \cdot 3^2 \cdot 9$$

$$= a^{1/2 - \frac{2}{3} - \frac{5}{6}} + a^{1/2 - 2/3 - 5/6}$$

$$= 18$$

$$= 2 \left( a^{1/2 - 2/3 - \frac{5}{6}} \right) = 2(a^{-1}) = \frac{2}{a}$$



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$$(k) \left( \frac{\sqrt{72y^{2n}}}{3} \cdot 9^0 \right) (2y^{n+2})^{-1}$$

Ans.  $\frac{\sqrt{2}}{y^2}$

Sol.  $\frac{\sqrt{72}\sqrt{y^{2n}}}{3} (1) \cdot \frac{1}{2y^{n+2}}$   
 $\frac{6\sqrt{2}y^n}{3} \cdot \frac{1}{2y^{n+2}} = \frac{\sqrt{2}}{y^2}$

4. (a)  $(25)^0 + (0.25)^{1/2} - 8^{1/3} \times 4^{-1/2} + (0.027)^{1/3}$

Ans. 0.8

Sol.  $1 + \left(\frac{1}{4}\right)^{1/2} - (2^3)^{1/3} \cdot (2^2)^{-1/2} + \left(\frac{27}{1000}\right)^{1/3}$

$$1 + \left[\left(\frac{1}{2}\right)^2\right]^{1/3} - 2 \cdot 2^{-1} + \left[\left(\frac{3}{10}\right)^3\right]^{1/3} = 1 + \frac{1}{2} - 1 + \frac{3}{10}$$

$$= 0.5 + 0.3 = 0.8$$

(b)  $\frac{1}{8^{-2/3}} - 3(a)^0 + (3a)^0 + (27)^{-1/3} - 1^{3/2}, a \neq 0$

Ans.  $\frac{4}{3}$

Sol.  $8^{2/3} - 3(1) + (1) + (3^3)^{\frac{1}{3}} - 1$

$$(2^3)^{2/3} - 3 + 3^{-1}$$

$$4 - 3 + \frac{1}{3} = 4/3$$

(c)  $\frac{3^{-2} + 5(2)^0}{3-4(3)^{-1}}$

Ans.  $\frac{46}{15}$

Sol.  $= \frac{\frac{1}{9} + 5(1)}{\frac{3-4}{3}} = \frac{46/9}{5/3}$

$$= \frac{46}{15}$$

(d)  $\frac{3^0 x + 4x^{-1}}{x^{-2/3}}$  if  $x = 8$

Ans. 34

Sol.  $\left(x + \frac{4}{x}\right) x^{2/3} = \left(8 + \frac{4}{8}\right) 8^{2/3}$

$$\left(8 + \frac{1}{2}\right) \cdot 4 = \frac{17}{2} \cdot 4 = 34$$

(e)  $\frac{2+2^{-1}}{5} + (-8) - 4^{3/2}$

(f)  $(64)^{-2/3} - 3(150)^0 + 12(2)^{-2}$



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**Ans.**  $\frac{-31}{2}$

**Sol.**  $\frac{2+\frac{1}{2}}{5} - 8 - (2^2)^{3/2}$

$$\frac{5/2}{5} - 8 - 8 = \frac{1}{2} - 16 = -\frac{31}{2}$$

**Ans.**  $\frac{1}{16}$

**Sol.**  $(4^3)^{-2/3} - 3(1) + 12\left(\frac{1}{2^2}\right)$

$$\frac{1}{4^2} - 3 + \frac{12}{4}$$

$$\frac{1}{16} - 3 + 3 = \frac{1}{16}$$

**(g)**  $(0.125)^{-2/3} + \frac{3}{2+2^{-1}}$

**Ans.**  $\frac{26}{5}$

**Sol.**  $\left(\frac{1}{8}\right)^{-2/3} + \frac{3}{2+\frac{1}{2}}$

$$\left[\left(\frac{1}{2}\right)^3\right]^{-2/3} + \frac{3}{5/2} = 4 + \frac{6}{5}$$

$$= \frac{26}{5}$$

**(h)**  $\sqrt[n]{\frac{32}{25+n}}$

**Ans.**  $\frac{1}{2}$

**Sol.**  $= \left(\frac{2^5}{2^5 \cdot 2^n}\right)^{1/n}$

$$= \left(\frac{1}{2^n}\right)^{1/n} = \frac{1}{2}$$

**(i)**  $\frac{(60000)^3(0.00002)^4}{(100)^2(72000000)(0.0002)^5}$

**Ans.** 150

**Sol.** 
$$\frac{(6 \times 10^4)^3 \cdot \left(\frac{2}{10^5}\right)^4}{(10^2)^2 \cdot (72 \times 10^6) \cdot \left(\frac{2}{10^4}\right)^5} = \frac{6^3 \cdot 10^{12} \cdot 2^4 / 10^{20}}{10^4 \cdot 72 \cdot 10^6 \cdot 2^5 / 10^{20}} = \frac{6^3 \cdot 100}{72 \cdot 2}$$

$$= 25 \cdot 6 = 150$$

5. **(a)** 
$$\frac{(x^2+3x+4)^{1/3} \left[ \frac{-1}{2}(5-x)^{-1/2} \right] - (5-x)^{1/2} \left[ \frac{1}{3}(x^2+3x+4)^{-2/3} (2x+3) \right]}{(x^2+3x+4)^{2/3}} \text{ if } x = 1$$

**Ans.**  $\frac{-1}{3}$

**Sol.** Putting  $x = 1$  in  $x^2 + 3x + 4 = 8$   $5 - x = 4$

$$\frac{\left[(8^{1/3})\left(-\frac{1}{2}\right)\cdot(4^{-1/2})\right] - (4^{1/2})\cdot\frac{1}{3}(8)^{-2/3}\cdot 5}{8^{2/3}} = \frac{\left[2\cdot\left(-\frac{1}{2}\right)\cdot\left(\frac{1}{2}\right)\right] - \left(2\cdot\frac{1}{3}\cdot\frac{1}{4}\cdot 5\right)}{\frac{1}{4}\left(-\frac{1}{2}-\frac{5}{6}\right)} = \frac{-3-5}{-\frac{1}{8}-\frac{5}{24}} = \frac{-8}{\frac{24}{24}} = -\frac{1}{3}$$



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$$(b) \frac{(9x^2 - 5y)^{1/4} (2x) - x^2 \left[ \frac{1}{4} (9x^2 - 5y)^{-3/4} (18x) \right]}{(9x^2 - 5y)^{1/2}} \text{ if } x = 2, y = 4$$

Ans.  $\frac{7}{8}$

Sol. putting  $x = 2, y = 4$

$$9x^2 - 5y = 36 - 20 = 16$$

$$2x = 4$$

$$x^2 = 4$$

$$18x = 36$$

$$\frac{(16)^{1/4} \cdot (4) - (4) \cdot \frac{1}{4} (16)^{-3/4/36}}{(16)^{1/2}}$$

$$\frac{(2 \cdot 4) - \frac{1}{8} (36)}{4}$$

$$2 - \frac{9}{8} = 7/8$$

$$(c) \frac{(x+1)^{2/3} \left[ \frac{1}{2} (x-1)^{-1/2} \right] - (x-1)^{1/2} \left[ \frac{2}{3} (x+1)^{-1/3} \right]}{(x+1)^{4/3}}$$

Ans.  $\frac{7-x}{6(x-1)^{1/2}(x+1)^{5/3}}$

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

$$= \frac{\frac{3}{2} (x+1)^{2/3} (x+1)^{1/3} - 4 (x-1)^{1/2} (x-1)^{1/2}}{6 (x-1)^{1/2} (x+1)^{1/3} (x+1)^{4/3}}$$

$$= \frac{\frac{3}{2} (x+1) - 4 (x-1)}{6 (x-1)^{1/2} (x+1)^{1/3} (x+1)^{4/3}}$$

$$= \frac{(7-x)}{6 (x-1)^{1/2} (x+1)^{5/3}}$$



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(d)  $x - 1 + \sqrt{x^2 + 2x + 1}$

Ans.  $2x$  if  $x \geq -1$ ,  $-2$  if  $x \leq -1$

Sol.  $(x - 1) + \sqrt{(x + 1)^2}$

$(x - 1) + |x + 1|$

case(i)  $x + 1 \geq 0$  case (ii)  $x + 1 < 0$

$$\begin{aligned} (x - 1) + (x + 1) &\quad (x - 1) - (x + 1) \\ = 2x &\quad = -2 \end{aligned}$$

(e)  $3x - 2y - \sqrt{4x^2 - 4xy + y^2}$

Ans.  $x - y$  if  $2x \geq y$ ,  $5x - 3y$  if  $2x \leq y$

Sol.  $(3x - 2y) - \sqrt{(2x - y)^2}$

$(3x - 2y) - |2x - y|$

case (i)  $2x - y \geq 0$  case (ii)  $2x - y < 0$

$$\begin{aligned} (3x - 2y) - (2x - y) &\quad (3x - 2y) + (2x - y) \\ = x - y &\quad = 5x - 3y \end{aligned}$$