数Ⅱ　　中間対策２－１　　(　　)2(　　)　(　　)番　氏名

○途中式は消さないこと　○最後まで計算をすること

問１　次の値を求めよ．

(1)　$a^7 \times a^{-3}$

Ans. a^4

(2)　$(3a^3b^2)^3$

Ans. $27a^9b^6$

(3)　$(a^{-2}b)^{-3}$

Ans. $\frac{a^6}{b^3}$

(4)　$a^6b^5 \div (a^2b)^2$

$a^6b^5 \div a^4b^2$

Ans. a^2b^3

(5)　6^0

Ans. 1

(6)　2^{-3}

Ans. $\frac{1}{8}$

(7)　$3^7 \times 3^3 \div 3^9$

$3^{7+3-9} = 3^1 = 3$

Ans. 3

(8)　$\frac{a^2}{a^{-2}}$

$= a^2 \div a^{-2}$

$= a^{2-(-2)} = a^4$

Ans. a^4

問２　次の式を指数の形 $a^{\frac{n}{m}}$ に直しなさい．ただし，a は小さい整数になるようにせよ．

(1)　$\sqrt[3]{2}$

Ans. $2^{\frac{1}{3}}$

(2)　$\sqrt{27^3} = \sqrt{3^9}$

Ans. $3^{\frac{9}{2}}$

(3)　$\frac{1}{\sqrt[4]{5}} = \frac{1}{5^{\frac{1}{4}}} = 5^{-\frac{1}{4}}$

Ans. $5^{-\frac{1}{4}}$

(4)　$\frac{1}{\sqrt[3]{16}} = \frac{1}{\sqrt[3]{2^4}} = \frac{1}{2^{\frac{4}{3}}} = 2^{-\frac{4}{3}}$

Ans. $2^{-\frac{4}{3}}$

問４　次の式を計算せよ．

(1)　$\sqrt[3]{64} = \sqrt[3]{4^3} = 4$

Ans. 4

(2)　$\sqrt[5]{1}$

Ans. 1

(3)　$\sqrt[3]{\left(\frac{1}{8}\right)} = \sqrt[3]{\left(\frac{1}{2}\right)^3} = \frac{1}{2}$

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

(4)　$\sqrt[3]{2} \times \sqrt[3]{32} = \sqrt[3]{64}$

$= \sqrt[3]{4^3} = 4$

Ans. 4

(5)　$\frac{\sqrt[3]{32}}{\sqrt[3]{4}} = \sqrt[3]{8} = \sqrt[3]{2^3} = 2$

Ans. 2

(6)　$\sqrt[4]{81^2}$　$\sqrt[4]{9^4} = 9$

Ans. 9

(7)　$\left(\sqrt[4]{9}\right)^2 = \left(\sqrt[4]{3^2}\right)^2 = \left(\sqrt[4]{3}\right)^4 = 3$

Ans. 3

(8)　$\sqrt[4]{\sqrt{256}} = \sqrt[8]{256} = \sqrt[8]{2^8} = 2$

Ans. 2

問５　次の数を簡単にせよ．

(1)　$81^{\frac{3}{4}} = 9^{\frac{3}{2}} = 3^3 = 27$

Ans. 27

(2)　$32^{-\frac{1}{5}} = 2^{-1} = \frac{1}{2}$

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

(3)　$36^{-1.5} = 36^{-\frac{3}{2}} = 6^{-3} = \frac{1}{216}$

Ans. $\frac{1}{216}$

(4)　$64^{-\frac{2}{3}} \times 36^{\frac{1}{2}} = 4^{-2} \times 6 = \frac{6}{16} = \frac{3}{8}$

Ans. $\frac{3}{8}$

問６　次の式を計算せよ．

(1) $3^{\frac{1}{2}} \times 3^{\frac{3}{2}}$ $= 3^2 = 9$

Ans. 9

(2) $27^{\frac{1}{2}} \div 27^{\frac{1}{6}}$ $= 27^{\frac{2}{6}} = 27^{\frac{1}{3}} = 3$

Ans. 3

(3) $\left(2^{\frac{2}{3}}3^{\frac{1}{2}}\right)^6$ $= 2^4 \times 3^3$ $= 16 \times 27 = 432$

Ans. 432

(4) $5^{\frac{1}{4}} \times 5^{\frac{1}{3}} \div 5^{\frac{1}{12}}$ $= 5^{\frac{3+4-1}{12}}$ $= 5^{\frac{1}{2}}$

Ans. $5^{\frac{1}{2}}$

(5) $\sqrt[4]{10} \times \sqrt[4]{8}$ $= \sqrt[4]{2^4 \times 5} = 2\sqrt[4]{5}$

Ans. $2\sqrt[4]{5}$

(6) $\sqrt[3]{3^2} \times \sqrt{3} \div \sqrt[6]{3}$ $= 3^{\frac{2}{3}} \times 3^{\frac{1}{2}} \div 3^{\frac{1}{6}} = 3^{\frac{4+3-1}{6}}$ $= 3$

Ans. 3

(9) $4^{\frac{1}{3}} \times 8^{\frac{1}{6}} \div 2^{\frac{1}{6}}$ $= 2^{\frac{2}{3}} \times 2^{\frac{3}{6}} \div 2^{\frac{1}{6}}$ $= 2^{\frac{4+3-1}{6}} = 2$

Ans. 2

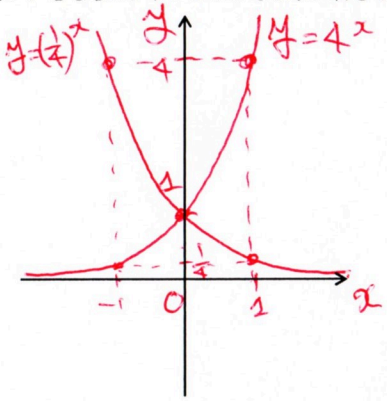
(10) $\sqrt[3]{2} \times \sqrt[6]{2} \div \sqrt[4]{4}$ $= 2^{\frac{1}{3}} \times 2^{\frac{1}{6}} \div 2^{\frac{2}{4}}$ $= 2^{\frac{2+1-3}{3}} = 2^0$

Ans. 1

問７　次のグラフを書きなさい．どちらのグラフかわかるように書きなさい．

(1) $y = 4^x$

(2) $y = \left(\frac{1}{4}\right)^x$



問８　次の数を小さい順に並べよ．

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

底が $2>1$ より

$2^{-2} < 2^{-1} < 2^{\frac{1}{2}} < 2^3$

Ans. $2^{-2} < 2^{-1} < 2^{\frac{1}{2}} < 2^3$

(2) $\left(\frac{9}{10}\right)^3,\ \left(\frac{9}{10}\right)^{-3},\ 1,\ \left(\frac{9}{10}\right)^2$

底が $0<\frac{9}{10}<1$ より

$\left(\frac{9}{10}\right)^3 < \left(\frac{9}{10}\right)^2 < 1 < \left(\frac{9}{10}\right)^{-3}$

Ans. $\left(\frac{9}{10}\right)^3 < \left(\frac{9}{10}\right)^2 < 1 < \left(\frac{9}{10}\right)^{-3}$

問９　次の方程式・不等式を解け．

(1) $2^x = 8$

$2^x = 2^3$

$x = 3$

Ans. $x = 3$

(2) $3^x = \frac{1}{81}$

$3^x = 3^{-4}$

$x = -4$

Ans. $x = -4$

(3) $5^{x-1} = \left(\frac{1}{25}\right)^{2x}$

$5^{x-1} = 5^{-4x}$

$x-1 = -4x$

$5x = 1$　$x = \frac{1}{5}$

Ans. $x = \frac{1}{5}$

(4) $\left(\frac{1}{25}\right)^x = \frac{1}{5}$

$5^{-2x} = 5^{-1}$

$-2x = -1$

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

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

(5) $2^x \leqq 16$

$2^x \leqq 2^4$

底が $2>1$ より

$x \leqq 4$

Ans. $x \leqq 4$

(6) $9^x > 27$

$3^{2x} > 3^3$

底が $3>1$ より

$2x > 3$

$x > \frac{3}{2}$

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

(7) $\left(\frac{1}{4}\right)^x \geqq \frac{1}{128}$

$2^{-2x} \geqq 2^7$

底が $2>1$ より

$-2x \geqq 7$

$x \leqq \frac{7}{2}$

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

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

$2^{-3x} \geqq 2^{-x-1}$

底が $2>1$ より

$-3x \geqq -x-1$

$-2x \geqq -1$

$x \leqq \frac{1}{2}$

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