

BÀI TẬP PHƯƠNG TRÌNH MŨ

Bài tập 1.

Giải các phương trình sau

- 1/ $32^{x+1} = 0,25.128^{x-1}$. ĐS: $x = 14$.
- 2/ $\left(3\sqrt{3\sqrt{3}}\right)^x = \left(\frac{1}{81}\right)^{2x-3}$. ĐS: $x = -\frac{16}{13}$.
- 3/ $\sqrt{2^x \sqrt[3]{4^x \sqrt[4]{0,125}}} = \sqrt[3]{0,25}$. ĐS: $x = \frac{-2 \pm \sqrt{19}}{5}$.
- 4/ $2.3^{x+1} - 6.3^{x-1} - 3^x = 9$. ĐS: $x = 1$.
- 5/ $2^x.5^{x-1} = \frac{1}{5}.10^{2-x}$. ĐS: $x = 1$.
- 6/ $8^{\frac{2x-1}{x+1}} = 0,25.(\sqrt{2})^{7x}$. ĐS: $x = 1 \vee x = \frac{2}{7}$.
- 7/ $0,125.4^{2x-3} = \left(\frac{\sqrt{2}}{8}\right)^{-x}$. ĐS: $x = 6$.
- 8/ $2^x.5^x = 0,1.(10^{x-1})^5$. ĐS: $x = \frac{3}{2}$.
- 9/ $(\sqrt{2})^x (\sqrt[3]{2})^{x-1} (\sqrt[4]{4})^{x^2-1} = 2^{\frac{2x-1}{2x}}$. ĐS: $x = 1 \vee x = -3 \vee x = \frac{1}{3}$.
- 10/ $\left(\frac{2}{5}\right)^x \cdot \left(\frac{25}{8}\right)^x = \frac{125}{64}$. ĐS: $x = 3$.
- 11/ $2^{2x^2+x+5} = 8^{2x+1}$. ĐS: $x = 2 \vee x = \frac{1}{2}$.
- 12/ $2^{x+1}.4^{x-1} \cdot \frac{1}{8^{1-x}} = 16^x$. ĐS: $x = 2$.
- 13/ $\sqrt{2^x} \cdot \sqrt{3^x} = 216$. ĐS: $x = 6$.
- 14/ $5^x.8^{x+1} = 100$. ĐS: $x = \log_{40} \frac{25}{2}$.
- 15/ $2^{x+1}.3^{2x+3} = 6^{3x+1}$. ĐS: $x = \log_{12} 9$.
- 16/ $9^{|3x-1|} = 3^{8x-2}$. ĐS: $x = \frac{2}{7}$.
- 17/ $5^{|2x-3|} = 125^x$. ĐS: $x = \frac{3}{5}$.
- 18/ $5^{|4x-6|} = 25^{3x-4}$. ĐS: $x = \frac{7}{5}$.

$$19/ \left(\frac{5}{3}\right)^{x+1} \cdot \left(\frac{9}{25}\right)^{x^2+2x-11} = \left(\frac{5}{3}\right)^9. \quad \underline{\text{DS:}} \quad x = 2 \vee x = -\frac{7}{2}.$$

$$20/ \left(\frac{1}{2}\right)^{x+7} \cdot \left(\frac{1}{2}\right)^{1-2x} = 2. \quad \underline{\text{DS:}} \quad x = 9.$$

$$21/ 4^{x+1} \cdot 3^{x-3} \cdot 5^{x+1} = \frac{20\sqrt{60}}{27}. \quad \underline{\text{DS:}} \quad x = \frac{1}{2}.$$

$$22/ 3^{x-1} = 6^x \cdot 2^{-x} \cdot 3^{x+1}. \quad \underline{\text{DS:}} \quad x = -2.$$

$$23/ 2^x \cdot 3^{x+1} = \left(\sqrt{3}\right)^{x+2}. \quad \underline{\text{DS:}} \quad x = 0.$$

$$24/ 3^{\frac{1}{\sqrt[3]{x^2 - \frac{17}{16}}}} = \frac{1}{9^{\sqrt[3]{x+1}}}. \quad \underline{\text{DS:}} \quad x = -\frac{5}{4} \vee x = 1 \vee x = -\frac{3}{4}.$$

$$25/ 5^x \cdot \sqrt[3]{8^x} = 100. \quad \underline{\text{DS:}} \quad x = 2 \vee x = -\log_5 10.$$

$$26/ (0,6)^x \cdot 5^{2x^2-24} = \left(\frac{3}{5}\right)^x \cdot 9^{x^2-12}. \quad \underline{\text{DS:}} \quad x = \pm 2\sqrt{3}.$$

$$27/ \sqrt{2^{x+1}} \cdot \sqrt[3]{4^{2x-1}} \cdot 8^{3-x} = 2\sqrt{2} \cdot 0,125. \quad \underline{\text{DS:}} \quad x = \frac{53}{7}.$$

$$28/ 2\sqrt{2^{\sqrt{6}}} \cdot 2^{\sqrt{x+1}} = 4^{\sqrt{x+1}}. \quad \underline{\text{DS:}} \quad x = \frac{3}{2}.$$

$$29/ \left(\frac{3}{4}\right)^{x-1} \cdot \sqrt{\left(\frac{4}{3}\right)^{\frac{8}{x}}} = \frac{9}{16}. \quad \underline{\text{DS:}} \quad x = -1 \vee x = 4.$$

$$30/ \left(\frac{5}{3}\right)^{x+1} \cdot \left(\frac{9}{25}\right)^{x^2+x-1} = 1. \quad \underline{\text{DS:}} \quad x = -\frac{3}{2} \vee x = 1.$$

$$31/ 27^{\frac{x+1}{x-1}} = \frac{1}{9} \cdot 81^{\frac{4x-2}{x+2}}. \quad \underline{\text{DS:}} \quad x = 3 \vee x = \frac{2}{11}.$$

$$32/ 16^{\frac{1}{x+2} - \frac{1}{x-2}} = 0,25 \cdot 2^{\frac{3x-19}{x^2-4}}. \quad \underline{\text{DS:}} \quad x = -1 \vee x = \frac{5}{2}.$$

Bài tập 2. Giải các phương trình sau

- 1/ $5^x + 5^{x+1} + 5^{x+2} = 3^x + 3^{x+3} + 3^{x+1}$. ĐS: $x = 0$.
- 2/ $3^{x+1} + 3^{x-2} - 3^{x-3} + 3^{x-4} = 750$. ĐS: $x = 5$.
- 3/ $2^x + 2^{x-1} + 2^{x-2} = 3^x + 3^{x-2} - 3^{x-1}$. ĐS: $x = 2$.
- 4/ $4^x + 4^{x-2} + 4^{x+1} = 3^{x+2} - 3^{x-2}$. ĐS: $x = \log_{\frac{4}{3}} \frac{1280}{729}$.
- 5/ $2^{x^2-1} + 2^{x^2+2} = 3^{x^2} + 3^{x^2-1}$. ĐS: $x = \pm\sqrt{3}$.
- 6/ $3^{x-1} + 3^x + 3^{x+1} = 9477$. ĐS: $x = 7$.
- 7/ $2^{2x+5} - 3^{x+\frac{9}{2}} = 3^{x+\frac{7}{2}} - 4^{x+4}$. ĐS: $x = -\frac{3}{2}$.
- 8/ $3 \cdot 4^x + \frac{1}{3} \cdot 9^{x+2} = 6 \cdot 4^{x+2} - \frac{1}{2} \cdot 9^{x+1}$. ĐS: $x = \log_{\frac{9}{4}} \frac{62}{21}$.
- 9/ $9^x - 2^{x+\frac{3}{2}} = 2^{x+\frac{1}{2}} - 3^{2x-1}$. ĐS: $x = \log_{\frac{9}{2}} \frac{9\sqrt{2}}{4}$.
- 10/ $3^x + 3^{x+1} + 3^{x+2} = \quad + 5^{x+1} + 5^{x+2}$. ĐS: $x = \log_{\frac{3}{5}} \frac{31}{16}$.
- 11/ $5^{x+\frac{1}{2}} - 9^x = 3^{2x-2} - 5^{x-\frac{1}{2}}$. ĐS: $x = \frac{3}{2}$.
- 12/ $4^{-x} - 3^{-x-\frac{1}{2}} = 3^{\frac{1}{2}-x} - 2^{-2x-1}$. ĐS: $x = -\frac{3}{2}$.

Bài tập 3. Giải các phương trình sau

- 1/ $(3 - 2\sqrt{2})^{3x} = 3 + 2\sqrt{2}$. ĐS: $x = -\frac{1}{3}$.
- 2/ $(5 + 2\sqrt{6})^{3x+1} = (5 - 2\sqrt{6})^{5x+8}$. ĐS: $x = -\frac{7}{8}$.
- 3/ $(3 + 2\sqrt{2})^{x+1} = (3 - 2\sqrt{2})^{2x+8}$. ĐS: $x = -3$.
- 4/ $(3 - 2\sqrt{2})^{3x^3-4x} = 3 + 2\sqrt{2}$. ĐS: $x = 1 \vee x = \frac{-3 \pm \sqrt{21}}{6}$.

$$5/ \quad (\sqrt{5} + 2)^{x-1} = (\sqrt{5} - 2)^{\frac{x-1}{x+1}}. \quad \underline{\text{DS:}} \quad x = 1 \vee x = -2.$$

$$6/ \quad (\sqrt{82} - 9)^{\frac{x-3}{x-1}} = (\sqrt{82} + 9)^{\frac{x+1}{x+3}}. \quad \underline{\text{DS:}} \quad x = \pm\sqrt{5}.$$

$$7/ \quad (\sqrt{145} + 12)^{\frac{2x+1}{4x-3}} = (\sqrt{145} - 12)^{\frac{4x+3}{2x-1}}. \quad \underline{\text{DS:}} \quad x = \pm\frac{\sqrt{2}}{2}.$$

$$8/ \quad (\sqrt{226} - 25)^{\frac{3x+1}{x}} = (\sqrt{226} + 25)^{\frac{x}{3x-1}}. \quad \underline{\text{DS:}} \quad x = \pm\frac{\sqrt{10}}{10}.$$

$$9/ \quad (\sqrt{6 + \sqrt{35}})^{\frac{2x+5}{2x+1}} = (\sqrt{6 - \sqrt{35}})^{\frac{2x-1}{2x-5}}. \quad \underline{\text{DS:}} \quad x = \pm\frac{\sqrt{13}}{2}.$$

$$10/ \quad (7 + \sqrt{48})^{\sqrt{x^2-2x+9}} = (7 - \sqrt{48})^{2x-7}. \quad \underline{\text{DS:}} \quad x = 2.$$

Bài tập 4. Giải các phương trình sau

$$1/ \quad 16^{\frac{1}{x+2}} - \frac{1}{x-2} = 0,25 \cdot 2^{\frac{3x-7}{x^2-4}}. \quad \underline{\text{DS:}} \quad x = \frac{5}{2} \vee x = -1.$$

$$2/ \quad \left(\frac{1}{3}\right)^{2-x} + 3^{x-3} = 99 + \sqrt{\left(\frac{1}{9}\right)^{4-x}}. \quad \underline{\text{DS:}} \quad x = 6.$$

$$3/ \quad \left[\left(2^{\sqrt{x}+5}\right)^{\frac{1}{5\sqrt{x}+1}} \right]^{\frac{1}{\sqrt{x}}} = \frac{1}{2} \cdot 4^{\sqrt{x}} \quad \underline{\text{DS:}} \quad x = 1.$$

$$4/ \quad \left[2 \left(2^{\sqrt{x}+3}\right)^{\frac{1}{2\sqrt{x}}} \right]^{\frac{2}{\sqrt{x}-1}} = 4. \quad \underline{\text{DS:}} \quad x = 9.$$

$$5/ \quad \left[\left(\sqrt[5]{27}\right)^{\frac{x}{4}} \sqrt[3]{\frac{x}{3}} \right]^{\frac{x}{4} + \sqrt{\frac{x}{3}}} = \sqrt[4]{3^7}. \quad \underline{\text{DS:}} \quad x = 10.$$

$$6/ \quad 4^{x^2-4} + 4^{x^2+x-12} = 4^{2x^2+x-16} + 1. \quad \underline{\text{DS:}} \quad x = -4 \vee x = 3 \vee x = \pm 2.$$

Bài tập 5. Giải các phương trình sau

$$1/ \quad (x + 2)^{x^2-x-5} = (x + 2)^{x+10}. \quad \underline{\text{DS:}} \quad x = -1 \vee x = 5.$$

$$2/ \quad \left(\sqrt{2x - x^2}\right)^{x-1} = 1. \quad \underline{\text{DS:}} \quad x = 1.$$

$$3/ \quad \left(\sqrt{x - x^2}\right)^{x-2} = 1. \quad \underline{\text{DS:}} \quad x = 2.$$

- 4/ $(x^2 - x + 1)^{x^2-1} = 1.$ ĐS: $x = 0 \vee x = \pm 1.$
- 5/ $(x + 1)^{\sqrt{x-3}} = 1.$ ĐS: $x = 0 \vee x = 3.$
- 6/ $(2 + x - x^2)^{\sin x} - (2 + x - x^2)^{2-\sqrt{3}\cos x}.$ ĐS: $x = \frac{1 \pm \sqrt{5}}{2} \vee x = \frac{\pi}{6}.$
- 7/ $(x - 3)^{3x^2-5x+2} = (x^2 - 6x + 9)^{x^2+x-4}.$ ĐS: $x = 4 \vee x = 5.$
- 8/ $(x^2 - 2x + 2)^{\sqrt{4-x^2}} = 1.$ ĐS: $x = 1 \vee x = \pm 2.$
- 9/ $(x^2 - 5x + 4)^{x^2-4} = 1.$ ĐS: $x = \frac{5 \pm \sqrt{13}}{2} \vee x = -2.$
- 10/ $(x^2 - |x| + 1)^{\sqrt{4-x^2}} = \sqrt{x^2 - |x| + 1}.$ ĐS: $x = 0 \vee x = \pm 1 \vee x = \pm \frac{\sqrt{15}}{2}.$
- 11/ $(x^2 - 2x + 2)^{\sqrt{9-x^2}} - \sqrt[3]{x^2 - 2x + 2} = 0.$ ĐS: $x = 1 \vee x = \pm \frac{4\sqrt{5}}{3}.$
- 12/ $\sqrt[3]{(x-1)^{x-1}} = (x-1)^{\sqrt[3]{x-1}}.$ ĐS: $x = 0 \vee x = 2 \vee x = 1 + 3\sqrt{3}.$
- 13/ $|x - 3|^{x^2-x} = (x - 3)^2.$ ĐS: $x = -1 \vee x = 2 \vee x = 4.$

Bài tập 6.

Giải các phương trình sau

- 1/ $2^{x^2-4} = 5^{x-2}.$ ĐS: $x = 2 \vee x = \log_2 \frac{5}{4}.$
- 2/ $5^{x^2-5x+6} = 2^{x-3}.$ ĐS: $x = 3 \vee x = \log_5 50.$
- 3/ $3^{x^2-4x} = 2^{x-4}.$ ĐS: $x = 4 \vee x = \log_3 2.$
- 4/ $8^x \cdot 5^{x^2-1} = \frac{1}{8}.$ ĐS: $x = -1 \vee x = 1 - \log_5 8.$
- 5/ $3^x \cdot 4^{\frac{x-1}{x}} = 18.$ ĐS: $x = 2 \vee x = -\log_3 2.$
- 6/ $3^{x^2-2} \cdot 4^{\frac{2x-3}{x}} = 18.$ ĐS: $x = 2.$
- 7/ $3^x \cdot 2^{x^2} = 1.$ ĐS: $x = 0 \vee x = -\log_2 3.$
- 8/ $2^x \cdot 5^{x^2} = 10.$ ĐS: $x = 1 \vee x = -1 - \log_5 2.$
- 9/ $3^x \cdot 2^{\frac{3x}{x+2}} = 6.$ ĐS: $x = 1.$
- 10/ $8^{\frac{x}{3x+6}} = 36 \cdot 3^{2+x}.$ ĐS: $x = -4 \vee x = \log_2 \frac{3}{4}.$

- 11/ $4.9^{x-1} = 3.2^{\frac{2x+1}{2}}$. DS: $x = \frac{3}{2}$.
- 12/ $8^{\frac{x}{x+2}} = 36.3^{2-x}$. DS: $x = 4 \vee x = -2 - \log_3 2$.
- 13/ $2^{x^2-2x}.3^x = \frac{3}{2}$. DS: $x = 1 \vee x = \log_2 \frac{2}{3}$.
- 14/ $3^x.8^{\frac{x}{x+1}} = 36$. DS: $x = 2 \vee x = \log_2 \frac{3}{2}$.
- 15/ $5^{x-2}.2^{\frac{3x}{x+1}} = 4$. DS: $x = 2 \vee x = \log_5 \frac{2}{5}$.
- 16/ $5^{2x-1} = 7^{3-x}$. DS: $x = 4 \log_{175} 5$.
- 17/ $5^{3-\log_5 x} = 25x$. DS: $x = \sqrt{5}$.
- 18/ $x^{4\lg \frac{x}{4}} = 1600^2$. DS: $x = 40 \vee x = \frac{1}{10}$.
- 19/ $x^4.5^3 = 5^{\log_x 5}$. DS: $x = \frac{1}{5} \vee x = \sqrt[4]{5}$.
- 20/ $\sqrt[4]{x^{\log \sqrt{x}}} = 100$. DS: $x = 10^{\pm 4}$.
- 21/ $x^{\log x} = 1000x^2$. DS: $x = \frac{1}{10} \vee x = 1000$.
- 22/ $x^{\log_2 x-4} = 32$. DS: $x = 2 \vee x = \frac{1}{32}$.
- 23/ $7^{\log_{25}^2(5x)-1} = x^5$. DS: $x = 125 \vee x = \frac{1}{5}$.
- 24/ $7^x = 5^x$. DS: $x = \log_{\frac{7}{5}}(\log_5 7)$.
- 25/ $5^x.2^{\frac{2x-1}{x+1}} = 50$. DS: $x = 2 \vee x = \log_2 \frac{5}{2}$.
- 26/ $9.x^{\log_9 x} = x^2$. DS: $x = 9$.
- 27/ $5^{x-1}.2^{2x^2-x+1} = 10.8^x$. DS: $x = 2 \vee x = -\frac{1}{2} \log_2 5$.
- 28/ $4.9^{x-1} = 3\sqrt{2^{2x+1}}$. DS: $x = \frac{3}{2}$.
- 29/ $4^x - 3^{x-\frac{1}{2}} = 3^{x+\frac{1}{2}} - 2^{2x-1}$. DS: $x = \frac{3}{2}$.