CEU guest
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Exam: Pass/Fail 72h take-home
Math 20/30
IT: solved perfectly

Books

- Algebra
- Functions
- Calculus
- Linear algebra
- Probablity

GPT

Algebra

- Powers
- Roots
- Fractions
- Simple equations
- Quadratic equations
- Systems of lin equations

Powers

$$a^n = \underbrace{a\,a\,a\,a\,\dots\,a}_{n\text{ times}}$$

$$a^0 = 1 \qquad a^{n+1} = a^n\,a$$

$n=0$

$$a^1 = a^0\,a$$

$$a = a^0\,a$$

$$\frac{a}{a} = a^0$$

$$1 = a^0$$

a^n $\quad a=0$ $\quad a^n = 0$

$0^0 = ?$ Undefined

$$a^{-n} = \frac{1}{a^n} \quad \forall a \neq 0$$

$$a^1\,a = a^0$$

$$a^1\,a = 1$$

$$a^1 = \frac{1}{a}$$

$$a^2\,a = a^1$$

$$a^2\,a = \frac{1}{a}$$

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

$$a^n\,a^m = a^{n+m}$$

$$\frac{a^n}{a^m} = a^{n-m}$$

$$(a^n)^m = a^{n\,m}$$

$$(a\,b)^n = a^n\,b^n$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$\underbrace{a\,a\,a\,\dots\,a}_{n\text{ times}}$ $\quad$ $\underbrace{a\,a\,a\,\dots\,a}_{m\text{ times}}$

$\underbrace{\frac{a\,a\,a\,\dots\,a}{a\,a\,a\,\dots\,a}}_{n\text{ times}}$

$$(-1)^5 = -1$$

$$\frac{z^5 : z^5}{z^3 : z^2} = \frac{z^{5-5}}{z^{3-2}} = \frac{z^0}{z^1} = z^{3-(-1)} = z^{-2}$$

$$\left(\frac{x\,y}{z}\right)^2 = 3 \qquad \left(\frac{z}{x\,y}\right)^6 = 27$$

$$a^{-n} = \frac{1}{a^n}$$

$$\left(\frac{1}{\frac{x\,y}{z}}\right)^2 = \left(\frac{z}{x\,y}\right)^2 = 3 \qquad \left(\left(\frac{z}{x\,y}\right)^2\right)^3 = \left(\frac{z}{x\,y}\right)^{2\cdot 3} = \left(\frac{z}{x\,y}\right)^6$$

$$3^3 = 3\,3\,3 = 27$$

Roots

$\sqrt{\quad}$ -> radical

$$\sqrt[n]{z} = z \qquad z^n = x \qquad \sqrt{x^1} = \sqrt[2]{x}$$

$$\sqrt[n]{x} = x^{\frac{1}{n}} \qquad z^{n\frac{1}{n}} = x^{\frac{1}{n}} \qquad \sqrt{4} = 2$$

$$z^{\frac{n}{n}} = z = x^{\frac{1}{n}} \qquad 4^{\frac{1}{2}} = \sqrt[2]{2} = 2$$

$$\sqrt[n]{x} = x^{\frac{1}{n}}$$

$$\sqrt[b]{x^a} = x^{\frac{a}{b}}$$

$$\sqrt[b]{x^a} = z$$

$$x^a = z^b$$

$$x^{a\frac{1}{b}} = z^{b\frac{1}{b}}$$

$$x^{\frac{a}{b}} = z = \sqrt[b]{x^a}$$

$$\sqrt[b]{x^a} = x^{\frac{a}{b}}$$

$$\sqrt[n]{a\,b} = \sqrt[n]{a}\,\sqrt[n]{b} \qquad \forall a,b \in \mathbb{R}_0^+$$

for all $\in$ in

$\mathbb{R}$ real numbers

$\mathbb{R}^+$ positive real numbers

$\mathbb{R}_0$ non-negative real numbers

$\mathbb{N}$ natural numbers 0,1,2,3,4...

$\mathbb{Z}$ integer numbers ... -3,-2,-1,0,1,2,3...

$\mathbb{R}$ any number with a decimal point representation
3,14 27 3 -2

$\sqrt{-1} = z$

$z^2 = -1$

$\sqrt{-1} = i$ -> imaginary unit -> $\mathbb{C}$ complex number

$4.18 + 2.05i$ -> complex

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \qquad \forall a \in \mathbb{R}_0^+,\ b \in \mathbb{R}^+$$

$$\sqrt{1600} = 40 \qquad z^2 = 1600 \qquad z = 40$$

$$125^{\frac{1}{3}} = 5 = \sqrt[3]{125} \qquad z^3 = 125$$

$$x^{0.25} = 2$$

$$\left(x^{0.25}\right)^4 = 2^4$$

$$x^{0.25\cdot 4} = x^1 = 16$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$(a+b)(a-b) = a^2 - b^2$$

$$\frac{1000^2}{252^2 - 248^2} = \frac{1000^2}{(252+248)(252-248)} = \frac{1000^2}{500\cdot 4} = \frac{1000^2}{2000} = \frac{1000}{2} = 500$$