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کاری دیگر از استاد شطری شرف آخر

دی وی های آموزشی ریاضیات نشر حرف آخر

ریاضی عمومی ۲

ریفرانسیل

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ریاضیات

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نمای

حسابان

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ریاضی

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۱) اتحاد های مهم ...

$$\textcircled{1} (a \pm b)^r = a^r \pm rab + b^r$$

$$\textcircled{2} (a+b)^r + (a-b)^r = ra^r + rb^r \quad (a+b)^r - (a-b)^r = rab$$

$$\textcircled{3} (a+b)(a-b) = a^r - b^r$$

$$\textcircled{4} (a \pm b)^r = a^r \pm ra^r b + rab^r \pm b^r$$

$$\textcircled{5} (x+a)(x+b) = x^r + (a+b)x + ab$$

$$\textcircled{6} a^r \pm b^r = (a \pm b)(a^r \mp ab + b^r)$$

$$\textcircled{7} (a+b+c)^r = a^r + b^r + c^r + rab + rac + rbc$$

$$\textcircled{8} a^r + b^r + c^r - rabc = (a+b+c)(a^r + b^r + c^r - ab - ac - bc)$$



(۲) اتحاد های مثلثاتی

$$\textcircled{1} \quad \tan \alpha = \frac{\sin \alpha}{\cos \alpha} \quad \cot \alpha = \frac{\cos \alpha}{\sin \alpha} \quad \tan \alpha = \frac{1}{\cot \alpha}$$

$$\textcircled{2} \quad \sin^2 \alpha + \cos^2 \alpha = 1 \quad 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \quad 1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha}$$

$$\textcircled{3} \quad \sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \sin \beta \cos \alpha \quad \sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\textcircled{4} \quad \cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta \quad \cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$\textcircled{5} \quad \cos 2\alpha = 2 \cos^2 \alpha - 1 = 1 - 2 \sin^2 \alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$\textcircled{6} \quad \sin^2 \alpha = \frac{1 - \cos 2\alpha}{2} \quad \cos^2 \alpha = \frac{1 + \cos 2\alpha}{2}$$

$$\textcircled{7} \quad (\sin \alpha \pm \cos \alpha)^2 = 1 \pm \sin 2\alpha$$

$$\textcircled{8} \quad \tan \alpha + \cot \alpha = \frac{2}{\sin 2\alpha} \quad \tan \alpha - \cot \alpha = -\frac{2 \cot 2\alpha}{\sin 2\alpha}$$

$$\textcircled{9} \quad \sin^2 \alpha = \frac{2 \tan \alpha}{1 + \tan^2 \alpha} \quad \cos^2 \alpha = \frac{1 - \tan^2 \alpha}{1 + \tan^2 \alpha} \quad \frac{2 \tan \alpha}{1 - \tan^2 \alpha} = \tan 2\alpha$$



$$(11) \sin^r \alpha + \cos^r \alpha = 1 - r \sin^r \alpha \cdot \cos^r \alpha = 1 - \frac{1}{r} \sin^{2r} \alpha$$

$$(12) \tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \cdot \tan \beta} \quad \tan r\alpha = \frac{r \tan \alpha}{1 - \tan^2 \alpha}$$

$$(13) \cot(\alpha + \beta) = \frac{\cot \alpha \cdot \cot \beta \mp 1}{\cot \beta \pm \cot \alpha} \quad \cot r\alpha = \frac{\cot \alpha - 1}{r \cot \alpha}$$

$$(14) \sin \alpha \pm \cos \alpha = \sqrt{r} \sin\left(\alpha \pm \frac{\pi}{4}\right) \quad \cos \alpha \mp \sin \alpha = \sqrt{r} \cos\left(\alpha \pm \frac{\pi}{4}\right)$$

$$(15) \sin^r \alpha = r \sin \alpha - r \sin^3 \alpha \quad \cos^r \alpha = r \cos \alpha - r \cos^3 \alpha$$

$$(16) \sin \alpha \pm \sin \beta = r \sin\left(\frac{\alpha \pm \beta}{r}\right) \cdot \cos\left(\frac{\alpha \mp \beta}{r}\right)$$

$$(17) \cos \alpha + \cos \beta = r \cos\left(\frac{\alpha + \beta}{r}\right) \cdot \cos\left(\frac{\alpha - \beta}{r}\right)$$

$$(18) \cos \alpha - \cos \beta = -r \sin\left(\frac{\alpha + \beta}{r}\right) \cdot \sin\left(\frac{\alpha - \beta}{r}\right)$$

$$(19) \tan \alpha \pm \tan \beta = \frac{\sin(\alpha \pm \beta)}{\cos \alpha \cdot \cos \beta} \quad \cot \alpha \pm \cot \beta = \frac{\sin(\beta \pm \alpha)}{\sin \alpha \cdot \sin \beta}$$

$$(20) \sin \alpha \cdot \cos \beta = \frac{1}{r} (\sin(\alpha + \beta) + \sin(\alpha - \beta))$$

$$(21) \sin \alpha \cdot \sin \beta = \frac{-1}{r} (\cos(\alpha + \beta) - \cos(\alpha - \beta))$$

$$(22) \cos \alpha \cdot \cos \beta = \frac{1}{r} (\cos(\alpha + \beta) + \cos(\alpha - \beta))$$

(۳) روابط مشتق

تابع	مشتق تابع	تابع	مشتق تابع
$y = a$	$y' = 0$		
$y = ax$	$y' = a$	$y = au$	$y' = au'$
$y = ax^n$	$y' = anx^{n-1}$	$y = au^n$	$y' = anu' u^{n-1}$
$y = a + x$	$y' = 1$	$y = u + v$	$y' = u' + v'$
		$y = uvw$	$y' = u'vw + v'u'w + w'u'v$
		$y = \frac{u}{v}$	$y' = \frac{u'v - v'u}{v^2}$
$y = \sqrt{x}$	$y' = \frac{1}{2\sqrt{x}}$	$y = \sqrt{u}$	$y' = \frac{u'}{2\sqrt{u}}$
$y = \sqrt[n]{x^m}$	$y' = \frac{m}{n\sqrt[n]{x^{n-m}}}$	$y = \sqrt[n]{u^m}$	$y' = \frac{mu'}{n\sqrt[n]{u^{n-m}}}$
$y = a^x$	$y' = a^x \ln a$	$y = a^u$	$y' = u' a^u \ln a$
$y = e^x$	$y' = e^x$	$y = e^u$	$y' = u' e^u$
$y = \ln x$	$y' = \frac{1}{x}$	$y = \ln u$	$y' = \frac{u'}{u}$
$y = \log_a x$	$y' = \frac{1}{x \ln a}$	$y = \log_a u$	$y' = \frac{u'}{u \ln a}$
$y = \sin x$	$y' = \cos x$	$y = a \sin^n u$	$y' = n.a.u' . \cos u . \sin^{n-1} u$
$y = \cos x$	$y' = -\sin x$	$y = a \cos^n u$	$y' = -n.a.u' . \sin u . \cos^{n-1} u$
$y = \tan x$	$y' = 1 + \tan^2 x$	$y = a \tan^n u$	$y' = n.a.u' (1 + \tan^2 u) . \tan^{n-1} u$
$y = \cot x$	$y' = -(1 + \cot^2 x)$	$y = a \cot^n u$	$y' = -n.a.u' (1 + \cot^2 u) . \cot^{n-1} u$
$y = \sin^{-1} x$	$y' = \frac{1}{\sqrt{1-x^2}}$	$y = \sin^{-1} u$	$y' = \frac{u'}{\sqrt{1-u^2}}$
$y = \cos^{-1} x$	$y' = \frac{-1}{\sqrt{1-x^2}}$	$y = \cos^{-1} u$	$y' = \frac{-u'}{\sqrt{1-u^2}}$
$y = \tan^{-1} x$	$y' = \frac{1}{1+x^2}$	$y = \tan^{-1} u$	$y' = \frac{u'}{1+u^2}$
$y = \cot^{-1} x$	$y' = \frac{-1}{1+x^2}$	$y = \cot^{-1} u$	$y' = \frac{-u'}{1+u^2}$
$y = \frac{a}{x}$	$y' = \frac{-a}{x^2}$	$y = \frac{ax+b}{cx+d}$	$y' = \frac{\begin{vmatrix} a & b \\ c & d \end{vmatrix}}{(cx+d)^2}$
$y = \frac{a}{x^n}$	$y' = \frac{-an}{x^{n+1}}$	$y = \frac{a}{u^n}$	$y' = \frac{-u' an}{x^{n+1}}$





فرمول های انتگرال

$$① \int 1 dx = \int dx = x + C$$

$$② \int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1) \quad \int x^{-1} dx = \ln x$$

$$③ \int k a^{nx} dx = \frac{k a^{nx}}{n \ln a} + C$$

$$④ \int e^{ax} dx = \frac{e^{ax}}{a} + C$$

$$⑤ \int k \sin ax dx = -\frac{k}{a} \cos ax + C$$

$$⑥ \int k \cos ax dx = \frac{k}{a} \sin ax + C$$

$$⑦ \int k \tan ax dx = -\frac{k}{a} \ln |\cos ax| + C$$

$$⑧ \int k \cot ax dx = \frac{k}{a} \ln |\sin ax| + C$$

$$⑨ \int (1 + \tan^2 ax) dx = \frac{1}{a} \tan ax + C$$

$$⑩ \int (1 + \cot^2 ax) dx = -\frac{1}{a} \cot ax + C$$

$$⑪ \int \frac{du}{u} = \ln |u| + C$$

$$⑫ \int \frac{dx}{\sqrt{a^2 - b^2 x^2}} = \frac{1}{b} \sin^{-1} \frac{bx}{a} + C = -\frac{1}{b} \cos^{-1} \frac{bx}{a} + C$$

$$⑬ \int \frac{dx}{a^2 + b^2 x^2} = \frac{1}{ab} \tan^{-1} \frac{bx}{a} + C = -\frac{1}{b} \cot^{-1} \frac{bx}{a} + C$$

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آرش سجاری

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