Matematika fanidan test topshiriqlarini yechish bo‘yicha abituriyentlar uchun ayrim tavsiyalar

Taqdim etilayotgan ushbu tavsiyanoma matematikaning ayrim misollarini yechishda ko‘makchi vazifasini bajarishini quyida keltirilgan misollarda ko‘rish mumkin. Kodifikator va tafsilotlarning 1.4, 1.6, 1.9, 1.10, 1.11, 2.2 bo‘limlariga oid qiyinchilik darajalari har xil bo‘lgan misollar yechimlari bilan keltirilgan.

Burchaklar yig‘indisi yoki ayirmasining trigonometrik funksiyalari, trigonometrik funksiyalar yig‘indisi, ayirmasi yoki ko‘paytmalari uchun formulalardan quyidagi ko‘rinishda foydalanish ba’zi misollarni yechishni ancha soddalashtiradi:

1. $tg(arctga \pm arctgb) = \dfrac{a \pm b}{1 \mp ab}, \quad a \cdot b \neq \pm 1$

2. $tg(arctga \pm arcctgb) = -\dfrac{1 \pm ab}{a \mp b}, \quad a \pm b \neq 0$

$a \cdot b = c \cdot d$ uchun quyidagi munosabatlar o‘rinli:

3. $\left(a\cos bx \pm c\cos dx\right)' = -2ab\sin\dfrac{b \pm d}{2}x \cdot \cos\dfrac{b \mp d}{2}x$

4. $\left(a\sin bx + c\sin dx\right)' = 2ab\cos\dfrac{b+d}{2}x \cdot \cos\dfrac{b-d}{2}x$

5. $\left(a\sin bx - c\sin dx\right)' = 2ab\sin\dfrac{b+d}{2}x \cdot \sin\dfrac{d-b}{2}x$

$|a| \neq |b|$ uchun quyidagi munosabatlar o‘rinli:

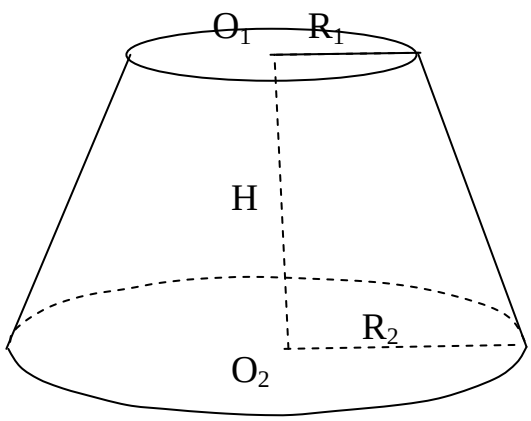
6. $\int \cos ax\cos bxdx = \dfrac{1}{2(a+b)}\sin(a+b)x + \dfrac{1}{2(a-b)}\sin(a-b)x + C,$

7. $\int \cos ax\sin bxdx = \dfrac{1}{2(a-b)}\cos(a-b)x - \dfrac{1}{2(a+b)}\cos(a+b)x + C$

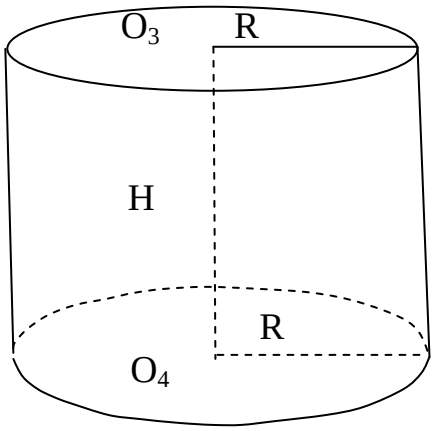
8. $\int \sin ax\sin bxdx = \dfrac{1}{2(a-b)}\sin(a-b)x - \dfrac{1}{2(a+b)}\sin(a+b)x + C$

9. Asoslarining radiuslari R_1 va R_2 ga teng bo‘lgan kesik konus va unga tengdosh silindrning balandliklari ham o‘zaro teng bo‘lsa, silindr asosining radiusini toping.

Yechilishi:



Kesik konus



Silindr

Jismlar hajmlari quyidagi formulalar orqali topiladi:

kesik konus uchun $V_{k.k} = \frac{1}{3}\pi H\left(R_1^2 + R_1R_2 + R_2^2\right)$

silindr uchun $V_s = \pi HR^2$

Ularni tenglashtiramiz $\pi R^2 H = \frac{1}{3}\pi H\left(R_1^2 + R_1R_2 + R_2^2\right) \Rightarrow R^2 = \frac{R_1^2 + R_1R_2 + R_2^2}{3}$.

Natijada $R = \sqrt{\frac{R_1^2 + R_1R_2 + R_2^2}{3}}$

Ushbu 1 va 2 - topshiriqlar abituriyentlar tayyorgarlik darajasiga qo‘yiladigan talablar kodifikatorining birinchi bo‘limdagi fan mazmunining 1.4 bo‘lim kodiga, ikkinchi bo‘limda keltirilgan o‘zlashtirish zarur bo‘lgan bilim, ko‘nikma va talablarning 2.1 talab kodiga va test topshiriqlari tafsilotida keltirilgan birinchi murakkablik darajasiga mos tushadi.

1 - test topshirig‘i

Hisoblang: $\mathrm{tg}\left(\mathrm{arctg2\text{-}arctg}\frac{1}{2}\right)$.

A) $\frac{3}{4}$ B) $\frac{3}{2}$ C) $\frac{4}{3}$ D) $\frac{2}{3}$

Yechilishi: $\mathrm{tg}\left(\mathrm{arctg2\text{-}arctg}\frac{1}{2}\right) = \frac{\mathrm{tg(arctg2)\text{-}tg(arctg}\frac{1}{2})}{1+\mathrm{tg(arctg2)}\cdot\mathrm{tg(arctg}\frac{1}{2})} = \frac{2-\frac{1}{2}}{1+2\cdot\frac{1}{2}} = \frac{\frac{3}{2}}{2} = \frac{3}{4}$.

To‘g‘ri javob: A) $\frac{3}{4}$

Manba: A.U.Abduhamidov va b., Algebra va matematik analiz asoslari, II qism, akademik lisey lar uchun, 2010y., .37.,91 betlar.

2 - test topshirig‘i

Hisoblang: $\operatorname{tg}\left(\operatorname{arctg}2-\operatorname{arcctg}\frac{1}{2}\right)$. A) $\frac{3}{4}$ B) $\frac{3}{2}$ C) $\frac{4}{3}$ D) 0

Yechilishi: $\operatorname{tg}\left(\operatorname{arctg}2-\operatorname{arcctg}\frac{1}{2}\right)=-\frac{1-2\cdot\frac{1}{2}}{2+\frac{1}{2}}=\frac{0}{\frac{5}{2}}=0.$

To‘g‘ri javob: D) 0

Manba: A.U.Abduhamidov va b., Algebra va matematik analiz asoslari, II qism, akademik liseylar uchun darslik, 2010y., 37,. 91 betlar.

Ushbu 3, 4 va 5 - topshiriqlar abituriyentlar tayyorgarlik darajasiga qo‘yiladigan talablar kodifikatorining birinchi bo‘limdagi fan mazmunining 1.10, 1.11 bo‘lim kodlariga, ikkinchi bo‘limda keltirilgan o‘zlashtirish zarur bo‘lgan bilim, ko‘nikma va talablarning 3.2 talab kodiga va test topshiriqlari tafsilotida keltirilgan ikkinchi murakkablik darajasiga mos tushadi.

3 - test topshirig‘i

$y=5\sin 9x+3\sin 15x$ funksiyaning hosilasini toping.

A) $90\cos 3x\cos 12x$

B) $-90\cos 3x\cos 12x$

C) $90\sin 3x\sin 12x$

D) $-90\sin 3x\sin 12x$

Yechilishi:

$y'=\left(5\sin 9x+3\sin 15x\right)'=\left(5\sin 9x\right)'+\left(3\sin 15x\right)'=45\cos 9x+45\cos 15x=45\left(\cos 9x+\cos 15x\right)$
$=45\cdot 2\cdot\cos 12x\cos 3x=90\cos 3x\cos 12x.$

To‘g‘ri javob: A) $90\cos 3x\cos 12x$

Manba: A.U.Abduhamidov va b., Algebra va matematik analiz asoslari, II qism, akademik liseylar uchun darslik, 2010y., стр.196-199 betlar.

4 - test topshirig‘i

$y = 5\sin 9x - 3\sin 15x$ funksiyaning hosilasini toping.

A) $90\cos 3x\cos 12x$

B) $-90\cos 3x\cos 12x$

C) $90\sin 3x\sin 12x$

D) $-90\sin 3x\sin 12x$

Yechilishi: $y' = (5\sin 9x - 3\sin 15x)' = (5\sin 9x)' - (3\sin 15x)' = 45\cos 9x - 45\cos 15x =$
$= 45(\cos 9x - \cos 15x) = 45 \cdot 2 \cdot \sin 12x \sin 3x = 90\sin 3x \sin 12x$.

To‘g‘ri javob: C) $90\sin 3x\sin 12x$

Manba: A.U.Abduhamidov va b., Algebra va matematik analiz asoslari, II qism, akademik liseylar uchun darslik, 2010y., стр.196-199 betlar.

5 - test topshirig‘i

Kodifikator va tafsilotlardagi 1.11. bo‘lim, qiyinchilik darajasi II. $y = \cos 3x\cos 12x$ funksiya uchun boshlang‘ich funksiyani toping.

A) $\frac{1}{18}\sin 9x - \frac{1}{30}\sin 15x + C$

B) $\frac{1}{18}\sin 9x + \frac{1}{30}\sin 15x + C$

C) $\frac{1}{18}\cos 9x - \frac{1}{30}\cos 15x + C$

D) $\frac{1}{18}\cos 9x + \frac{1}{30}\cos 15x + C$

Yechilishi:

$$\int \cos 3x\cos 12x dx = \int \frac{1}{2}(\cos(3+12)x + \cos(12-3)x)\,dx = \frac{1}{2\cdot 15}\sin 15x + \frac{1}{2\cdot 9}\sin 9x + C =$$

$$\frac{1}{30}\sin 15x + \frac{1}{18}\sin 9x + C.$$

To‘g‘ri javob: B) $\frac{1}{18}\sin 9x + \frac{1}{30}\sin 15x + C$

Manba: A.U.Abduhamidov va b., Algebra va matematik analiz asoslari, II qism, akademik liseylar uchun darslik, 2010y., стр.242-249 betlar.

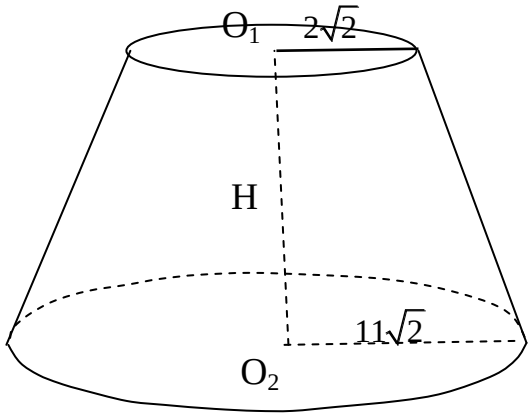
Ushbu 6 - topshiriq abituriyentlar tayyorgarlik darajasiga qo‘yiladigan talablar kodifikatorining birinchi bo‘limdagi fan mazmunining 2.2 bo‘lim kodiga, ikkinchi bo‘limda keltirilgan o‘zlashtirish zarur bo‘lgan bilim, ko‘nikma va talablarning 4.2 talab kodiga va test topshiriqlari tafsilotida keltirilgan uchinchi murakkablik darajasiga mos tushadi.

6 - test topshirig‘i

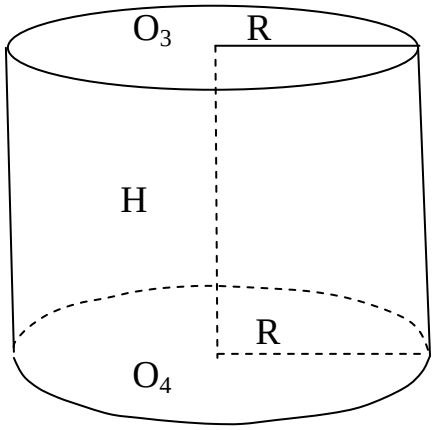
Asoslarining radiuslari $2\sqrt{2}$ va $11\sqrt{2}$ ga teng bo‘lgan kesik konus va unga tengdosh silindrning balandliklari ham o‘zaro teng bo‘lsa, silindr asosining radiusini toping.

A) $7\sqrt{2}$ B) $5\sqrt{2}$ C) $8\sqrt{2}$ D) $6\sqrt{2}$

Yechilishi:



Kesik konus



Silindr

Kesik konus va silindrning hajmlari mos ravishda quyidagi formulalar orqali topiladi: $V_{k.k} = \frac{1}{3}\pi H\left(R_1^2 + R_1R_2 + R_2^2\right)$, $V_s = \pi HR^2$. Masala shartida tengdosh ekanligidan ularning hajmlari tenglashtiriladi, ya’ni

$$\pi R^2 H = \frac{1}{3}\pi H\left(R_1^2 + R_1R_2 + R_2^2\right) \Rightarrow R^2 = \frac{R_1^2 + R_1R_2 + R_2^2}{3} \Rightarrow R = \sqrt{\frac{R_1^2 + R_1R_2 + R_2^2}{3}}$$

$$R = \sqrt{\frac{\left(2\sqrt{2}\right)^2 + 2\sqrt{2}\cdot 11\sqrt{2} + \left(11\sqrt{2}\right)^2}{3}} = \sqrt{\frac{8+44+242}{3}} = \sqrt{\frac{294}{3}} = \sqrt{98} = 7\sqrt{2}$$

To‘g‘ri javob: A) $7\sqrt{2}$

Manba: I.Isroilov va boshqalar, Геометрия, Akademik lisey va kasb-hunar kollejlari uchun darslik, 2010г., 236., 248-betlar