

3.91  
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$$p(-1) = 0, \quad p(1) = 4, \quad p(-1\frac{1}{2}) = -1$$

$$2x^3 + 3x^2 - 2x - 3 = 2x(x^2 - 1) + 3(x^2 - 1) = (2x + 3)(x^2 - 1)$$

$$p(x) = (2x^3 + 3x^2 - 2x - 3) \cdot q(x) + ax^2 + bx + c$$

$$p(1) = 4 = a + b + c \rightarrow c = 4 - a - b$$

$$p(-1\frac{1}{2}) = -1 = 2\frac{1}{4}a - 1\frac{1}{2}b + c \rightarrow -1 = 2\frac{1}{4}a - 1\frac{1}{2}b + 4 - a - b$$

$$-5 = 1\frac{1}{4}a - 2\frac{1}{2}b$$

$$p(-1) = 0 = a - b + c = a - b + 4 - a - b = 4 - 2b \rightarrow \boxed{b=2}, c=2$$

$$2x + 2 \quad \text{kein Problem} \quad a=0$$

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n(-1) = -1 - 1 - 1 = -3

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12

$$T_{k+1} = \binom{4}{k} x^{\frac{1}{2}(4-k)} x^{2k} \quad * (\sqrt{x}-x^2)^4 \quad \text{11. Binom } x^3 \text{ Binom}$$

$$3 = 2 - \frac{1}{2}k + 2k \rightarrow k = \frac{1}{2} \quad \text{11. Binom}$$

$$T_{l+1} = \binom{12}{l} x^{-\frac{1}{5}(12-l)} (-1)^l \quad \left(\frac{1}{\sqrt[5]{x}} - 1\right)^{12} \quad \text{11. Binom } x^6 \text{ Binom}$$

$$1 = -\frac{1}{5}(12-l) \rightarrow l = \frac{17}{5} \quad l > 12$$

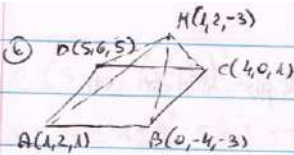
$$T_{m+1} = \binom{13}{m} (x^{-1})^{13-m} (-1)^m \quad \left(\frac{1}{x} - 1\right)^{13} \quad \text{11. Binom } x^0 \text{ Binom}$$

$$0 = -13 + m \rightarrow \underline{m = 13}$$

$$T_{14} = -\binom{13}{13} = -1$$

-1 (10. Binom also)

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$$D = A + \vec{BC} = (1, 2, 1) + (4, 4, 4) = (5, 6, 5)$$

$$\begin{array}{l} \vec{AB} \\ \vec{BC} \end{array} \begin{vmatrix} x-1 & y-2 & z-1 \\ -1 & -6 & -4 \\ 4 & 4 & 4 \end{vmatrix}$$

התקדמות: מציאת המישור

$$\begin{aligned} &= -8(x-1) - 12(y-2) + 20(z-1) = 0 \\ &-8x - 12y + 20z + 12 = 0 \\ &2x + 3y - 5z - 3 = 0 \end{aligned}$$

$$\textcircled{2} \quad \cos \alpha = \frac{|(0, 0, -4) \cdot (4, 4, 2)|}{4 \sqrt{16}} = \frac{32}{4 \cdot 4 \sqrt{6}} = \frac{2}{\sqrt{6}} = \frac{\sqrt{6}}{3}$$

$$\textcircled{3} \quad V = \frac{1}{3} |\vec{AB} \times \vec{BC}| \cdot MO = \frac{1}{3} \sqrt{608} \cdot \frac{20}{\sqrt{38}} = \frac{80}{3}$$

$$|\vec{AB} \times \vec{BC}| = \left| \begin{vmatrix} i & j & k \\ -1 & -6 & -4 \\ 4 & 4 & 4 \end{vmatrix} \right| = |-8i - 12j + 20k| = \sqrt{608}; \quad MO = \frac{|2 \cdot 6 + 15 \cdot 3|}{\sqrt{38}} = \frac{20}{\sqrt{38}}$$

$$\textcircled{3} \quad (2+2t, -2-3t, -t-1)$$

$$2(2+2t) + 3(-2-3t) - 5(-t-1) - 3 = 0$$

$$0 = 0$$

לפי כללי המישור הוא  
נמצא במישור המישור  
ולכן כל נקודת המישור

3.91 ↓ 4	$\textcircled{1} C_5^3 \cdot C_4^2 \cdot 5! = 7200$ <p style="text-align: center;">             ↓                    ↓                    ↓              120                    6                    120              120                    120                    120           </p>	$\textcircled{2} 4 \cdot C_5^3 \cdot C_3^1 \cdot 4! = 2880$ <p style="text-align: center;">             ↓                    ↓                    ↓                    ↓              240                    10                    6                    240              120                    120                    120                    120           </p>
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S

(E)  $\sin \frac{\beta+\gamma}{2} \cos \frac{\alpha}{2} = \cos \frac{\alpha-\beta}{2} \cdot \sin \frac{\alpha}{2}$

$\gamma = 180 - \alpha - \beta$

$\sin \frac{\beta+180-\alpha-\beta}{2} \cdot \cos \left( \frac{180-\alpha-\beta}{2} \right) = \cos \frac{\alpha-\beta}{2} \cdot \sin \frac{\alpha}{2}$

$\sin \left( 90 - \frac{\alpha}{2} \right) \cdot \cos \left( 90 - \frac{\alpha+\beta}{2} \right) = \cos \frac{\alpha-\beta}{2} \sin \frac{\alpha}{2}$

$\cos \frac{\alpha}{2} \cdot \sin \frac{\alpha+\beta}{2} = \cos \frac{\alpha-\beta}{2} \sin \frac{\alpha}{2} \quad / : \cos \frac{\alpha}{2} \neq 0$   
erklärt

$\cos \frac{\alpha}{2} \left( \sin \frac{\alpha}{2} \cos \frac{\beta}{2} + \cos \frac{\alpha}{2} \sin \frac{\beta}{2} \right) = \left( \cos \frac{\alpha}{2} \cos \frac{\beta}{2} + \sin \frac{\alpha}{2} \sin \frac{\beta}{2} \right) \cdot \sin \frac{\alpha}{2}$

$\cos \frac{\alpha}{2} \cos \frac{\beta}{2} \sin \frac{\alpha}{2} + \cos^2 \frac{\alpha}{2} \sin \frac{\beta}{2} = \cos^2 \frac{\alpha}{2} \cos \frac{\beta}{2} \sin \frac{\alpha}{2} + \sin^2 \frac{\alpha}{2} \sin \frac{\beta}{2}$

$\hookrightarrow$  pfl pfl  $\sin \frac{\beta}{2} \neq 0$  erklärt

$\cos^2 \frac{\alpha}{2} = \sin^2 \frac{\alpha}{2}$

$\hookrightarrow$  pfl pfl erklärt  $\cos^2 \frac{\alpha}{2} \neq 0$

$1 = \tan^2 \frac{\alpha}{2}$

$\tan \frac{\alpha}{2} = 1$   $\tan \frac{\alpha}{2} = -1$   
erklärt erklärt

$\frac{\alpha}{2} = \frac{\pi}{4}$   
 $\alpha = \frac{\pi}{2}$

(2)  $\cos 6x + 4\cos 2x \geq 0$   
 $4\cos^2 x - 3\cos x = \cos 3x$  -f 1/3/2 2nd/2  
 $\downarrow$   $4\cos^2 2x - 3\cos 2x = \cos 6x$  1/1  
 $4\cos^2 2x - 3\cos 2x + 4\cos 2x \geq 0$   $\nearrow$  in the same  
 $0 \leq 4\cos^2 2x + \cos 2x = \cos 2x(4\cos^2 2x + 1)$

$\cos 2x = 0$   
 $2x = \frac{\pi}{2} + i\pi k \rightarrow x = \frac{\pi}{4} + i\pi k$

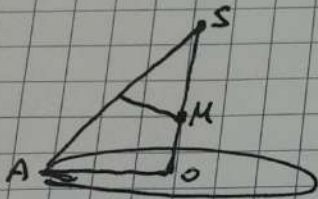
$\boxed{-\frac{\pi}{4} + i\pi k \leq x \leq \frac{\pi}{4} + i\pi k}$

3.91  
כ6

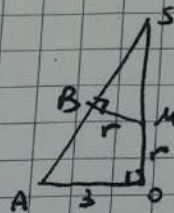
$$19\pi = \pi r l$$
$$l = 5$$



$$9\pi = \pi r^2$$
$$r = 3$$



M -> (אם לא מוכיח משהו)



(S-S)  $\triangle SBM \sim \triangle SBA$

$$\frac{BM}{AO} = \frac{SM}{AS}$$

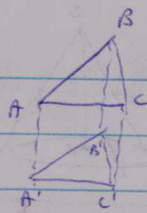
$$\frac{r}{3} = \frac{4-r}{5}$$

$$5r = 12 - 3r$$
$$\boxed{r = 1.5}$$

$SO = 4$  }  
אם לא מוכיח משהו }  
 $AS = l = 5$

3.9/6

(2)

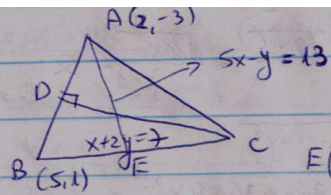


1) ,  $\triangle ABC$   $\cong$   $\triangle A'B'C'$   $\Rightarrow$   $\triangle ABC$   $\cong$   $\triangle A'B'C'$

$$\triangle ABC \cong \triangle A'B'C'$$



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$$C(7-2t, t) \quad \text{no}$$

$$E(6-t, \frac{1+t}{2}) \quad (B-1 \text{ } \vec{a} \vec{y}) \quad BC \text{ } \vec{a} \vec{y}$$

מקבילים אל המקבילים AE ו-BC

$$5(6-t) - (\frac{1+t}{2}) = 13 \rightarrow 5.5t = 16.5 \rightarrow t = 3 \rightarrow C(1, 3)$$

$$m_{AB} = \frac{4}{3} \rightarrow m_{CD} = -\frac{3}{4}$$

! CD מקביל

$$y - 3 = -\frac{3}{4}(x - 1) \rightarrow 4y + 3x = 15$$

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28

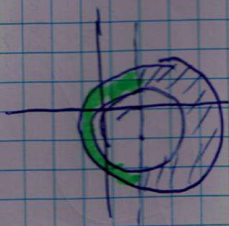
$$\frac{1}{4} < \operatorname{Re} \frac{1}{z} + \operatorname{Im} \frac{1}{z} < \frac{1}{2}$$

$$\frac{1}{4} < \frac{x}{x^2+y^2} + \frac{-y}{x^2+y^2} < \frac{1}{2} \quad \text{p.d.} \quad \frac{1}{z} = \frac{x-iy}{x^2+y^2} \quad \text{למה? אולי בדרך}$$

$$x^2+y^2 < 4x-4y \quad 2x-2y < x^2+y^2$$

$$(x-2)^2 + (y+2)^2 < 8 \quad 2 < (x-1)^2 + (y+1)^2$$

$$\operatorname{Re} z \leq 1 \rightarrow x \leq 1$$



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$$z^5 = 1 - i = \sqrt{2} \operatorname{cis} 3.145$$

$$z_k = \sqrt[5]{\sqrt{2}} \operatorname{cis} \left( \frac{-\pi}{20} + \frac{2k\pi}{5} \right) \quad k=0,1,2,3,4$$

$$\sqrt[10]{2} \operatorname{cis} \left( \frac{3\pi}{4} \right) = z_0 = \sqrt[10]{2} \operatorname{cis} \left( -\frac{\pi}{20} \right) \quad z_4 = \sqrt[10]{2} \operatorname{cis} \left( \frac{3\pi}{20} \right)$$

$$z_1 = \sqrt[10]{2} \operatorname{cis} \left( \frac{7\pi}{20} \right)$$

אולי ה/ה, מ/ה, א/ה, נ/ה, ס/ה  
: פירוש: אולי ה/ה, מ/ה, א/ה, נ/ה, ס/ה

$$\sqrt[10]{2} \operatorname{cis} \left( \frac{3\pi}{4} \right) = z_2 = \sqrt[10]{2} \operatorname{cis} \left( \frac{15\pi}{20} \right)$$

$$S_5 = \frac{a_1(9^5 - 1)}{9 - 1} = \frac{9^{10} - 1}{9 - 1} = \operatorname{cis} \left( \frac{2\pi}{5} \right)$$

$$S_5 = 0 \quad 9^5 = 1$$

$$z_3 = \sqrt[10]{2} \operatorname{cis} \left( \frac{23\pi}{20} \right)$$

ii

כל המספרים הריאליים הם המספרים הריאליים

$$(x-4+3i)(x-4-3i)(x+2) = (x^2-8x+25)(x+2) =$$

$$= x^3 - 8x^2 + 25x + 2x^2 - 16x + 50 = x^3 - 6x^2 + 9x + 50$$

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28 3.60 √ 775

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$$\begin{aligned}\left(\frac{1+i\sqrt{3}}{1-i}\right)^{40} &= \left(\frac{2\operatorname{cis}60}{\sqrt{2}\operatorname{cis}315}\right)^{40} = \left(\sqrt{2}\operatorname{cis}(-255)\right)^{40} = 2^{20}\operatorname{cis}\left(40\cdot\frac{-17\pi}{12}\right) \\ &= 2^{20}\operatorname{cis}\left(-\frac{2}{3}\pi\right) = 2^{20}\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = -2^{19}(1+\sqrt{3}i)\end{aligned}$$

$$\frac{7 \cdot 4^{x-2}}{4^x - 3 \cdot 5^x} \geq 1 + 3 \cdot \left(\frac{5}{4}\right)^x / 16$$

פירוק ימין חילוקי (נכנס 200 נכנס)

$$\frac{7 \cdot 4^x}{4^x \cdot 3 \cdot 5^x} \geq 16 + 48 \left(\frac{5}{4}\right)^x / 4^x - 3 \cdot 5^x$$

$$4^x \geq 3 \cdot 5^x \quad \text{נהגה}$$

$$\frac{1}{3} \geq \left(\frac{5}{4}\right)^x$$

$$\boxed{\log_{\frac{5}{4}} \left(\frac{1}{3}\right) \geq x}$$

$$7 \cdot 4^x \geq 16 \left[ 1 + 3 \cdot \left(\frac{5}{4}\right)^x \right] (4^x - 3 \cdot 5^x)$$

$$7 \cdot 4^x \geq 16 \left[ 4^x - 3 \cdot 5^x + 3 \cdot 4^x \cdot \left(\frac{5}{4}\right)^x - 9 \cdot 5^x \cdot \left(\frac{5}{4}\right)^x \right]$$

$$7 \cdot 4^x \geq 16 \left[ 4^x - 3 \cdot 5^x + 3 \cdot 5^x - 9 \cdot \frac{5^{2x}}{4^x} \right]$$

$$7 \cdot 4^x \geq 16 \left[ 4^x - 9 \cdot \frac{5^{2x}}{4^x} \right] \rightarrow 0 \geq 9 \cdot 4^x - 16 \cdot 9 \cdot \frac{5^{2x}}{4^x} \quad | \cdot \left(\frac{4^x}{9}\right)$$

$$0 \geq 4^{2x} - 16 \cdot 5^{2x}$$

$$0 \geq (4^x - 4 \cdot 5^x) (4^x + 4 \cdot 5^x)$$

$$4 \cdot 5^x \geq 4^x / 5^x \quad \text{חילוקי}$$

$$4 \geq \left(\frac{4}{5}\right)^x$$

$$\boxed{\log_{0.8} 4 \leq x}$$

$$\log_{0.8} 4 \leq x \leq \log_{\frac{5}{4}} \left(\frac{1}{3}\right)$$

! מה מה מה  
↓  
-  $\log_{\frac{5}{4}} 4 \leq x \leq -\log_{\frac{5}{4}} (3)$