

ראי ח'סאית ג'אומאית

#1 27/10

200686756

1) 100N 5m - 0.2N

: 1 2'82

$z(x)$ נקודה על גבי קוטרות $\sqrt{1+z_x^2+z_y^2}$ ק"מ $\frac{1}{\sqrt{1+z_x^2+z_y^2}}$

נניח $V \in \mathbb{F}^3$, $V = (x, y, z(x, y))$ נגזור
 את V ונראה שהיא נמצאת במישור

$$\begin{aligned} \|V_x \times V_y\|_2 &= \left\| \begin{pmatrix} \hat{x} & \hat{y} & \hat{z} \\ 1 & 0 & z_x \\ 0 & 1 & z_y \end{pmatrix} \right\|_2 = \|(-z_x, -z_y, 1)\|_2 \\ &= \sqrt{1 + z_x^2 + z_y^2} \end{aligned}$$

5. $\frac{1}{2}$

~~He Gunk~~ 7128 EL שנים שן שני ע' שן
Jaa : He Gunk se שני

$$L = \int da = \iint_R \sqrt{1+z_x^2+z_y^2} \, dx \, dy = \iint_R F(z, z_x, z_y) \, dx \, dy$$

$$\hat{z} = z + \epsilon \eta^*$$

$$\hat{z}_x = z_x + \varepsilon n_x$$

$$\hat{z}_y = z_y + \varepsilon \eta_y$$

$$\frac{dL}{d\varepsilon} = \frac{d}{d\varepsilon} \iint_{\Omega} F(\tilde{z}, \tilde{z}_x, \tilde{z}_y) dx dy = \iint_{\Omega} \frac{d}{d\varepsilon} F(\tilde{z}, \tilde{z}_x, \tilde{z}_y) dx dy =$$

$$\underline{\text{Green's}} \iint_{\Sigma} F_z \cdot n + F_x \cdot n_x + F_y \cdot n_y \, dx \, dy$$

$$\begin{aligned} \text{proof} \quad \Rightarrow \quad & \iint_{\Omega} F_{\vec{z}} \cdot \vec{n} \, dx \, dy + \underbrace{\int_{y_0}^{y_1} [F_{\vec{z}^x} \cdot \vec{n}] \Big|_{x_0}^{x_1} dy}_{x_0} + \underbrace{\int_{x_0}^{x_1} [F_{\vec{z}^y} \cdot \vec{n}] \Big|_{y_0}^{y_1} dx}_{y_0} \\ & - \iint_{\Omega} \left(\frac{d}{dx} F_{\vec{z}^x} + \frac{d}{dy} F_{\vec{z}^y} \right) \cdot \vec{n} \, dx \, dy \end{aligned}$$

④ כלל כ"ס ה', נ"ח חידא' ע"פ 0 =

$$\iint h \cdot \left[F_z - \left(\frac{1}{\lambda_1} F_{z_1} + \frac{1}{\lambda_2} F_{z_2} \right) \right] dx dy = 0$$

מחירי המלון הם 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 8

$$F_z - \frac{d}{dx} F_{z_x} - \frac{d}{dy} F_{z_y} = 0$$

מקור EL חומר מוליך

$F(x, y, z) = \sqrt{x^2 + y^2 + z^2}$ Gen (Wktg) F ist nicht lin.

$$F_z = 0 \quad F_{z_x} = -\frac{z_x}{\sqrt{1+z_x^2+z_y^2}} \quad F_{z_y} = -\frac{z_y}{\sqrt{1+z_x^2+z_y^2}}$$

$$\Rightarrow \operatorname{div} \left(\frac{\nabla z}{\sqrt{1+z_x^2+z_y^2}} \right) = 0$$

פרוטות מנה ב' יום ליל ג' אדר
 ל' אדר ב' ח' אדר

$$u(x_1, x_2, \dots, x_n, t) = u(\bar{x}; t) \quad : \bar{x} = (x_1, x_2, \dots, x_n) \quad \text{plus} \quad \frac{-10 \text{ points}}$$

$K(\bar{x}; t) = \frac{1}{\sqrt{\pi t}} e^{-\frac{\|\bar{x}\|^2}{4t}}$

אם ניקח $\bar{x} = \vec{0}$, אז $u(\vec{0}, t) = K(\vec{0}, t) * u_0$

כלומר: אם u_0 היא פונקציה קרוניקה, אז $u(\vec{0}, t)$ היא פונקציית גאוס.

$$\frac{\partial}{\partial t} (K(\bar{x}; t) * u_0) = \left(\frac{\partial}{\partial t} K(\bar{x}; t) \right) * u_0 \stackrel{\substack{\text{Leibniz} \\ \text{rule}}}{=} (\Delta K(\bar{x}; t)) * u_0$$

$$= \Delta(x(\bar{x}; t) * u_0)$$

כדירות נכונות ונא' השפה:

$$\lim_{t \rightarrow 0} \kappa(\bar{x}^0; t) = \delta(\bar{x})$$

Contingency fees

$$\Rightarrow u_0 = \delta(\bar{x}) * u_0$$

$\frac{6}{5} \times 10^8$

$$\frac{\partial}{\partial t} u(\vec{x}; t) = \Delta u(\vec{x}; t)$$

$$t > 0 \quad 7/28/1$$

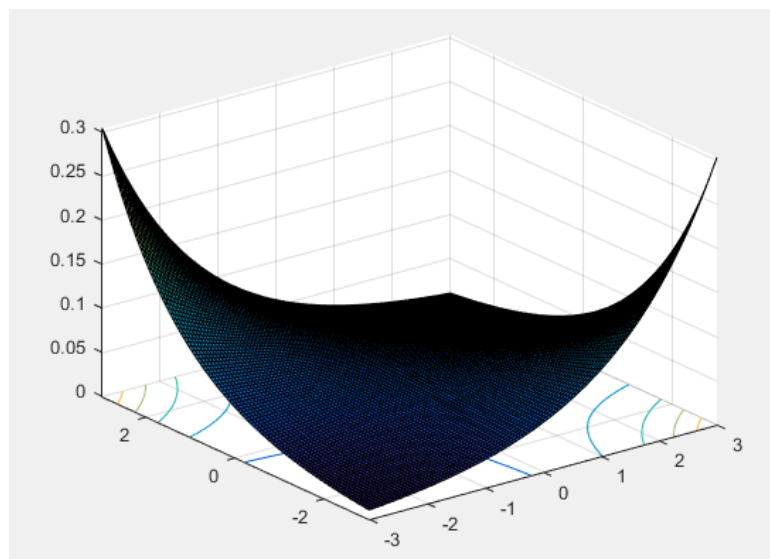
$$K(\vec{x}|t) = \frac{1}{\sqrt{\pi t \det(M)}} \cdot e^{-\frac{(\vec{x}^T M^{-1} \vec{x})}{4t}}$$

$\vec{x} = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$
 $M = \begin{pmatrix} a & c \\ c & b \end{pmatrix}$

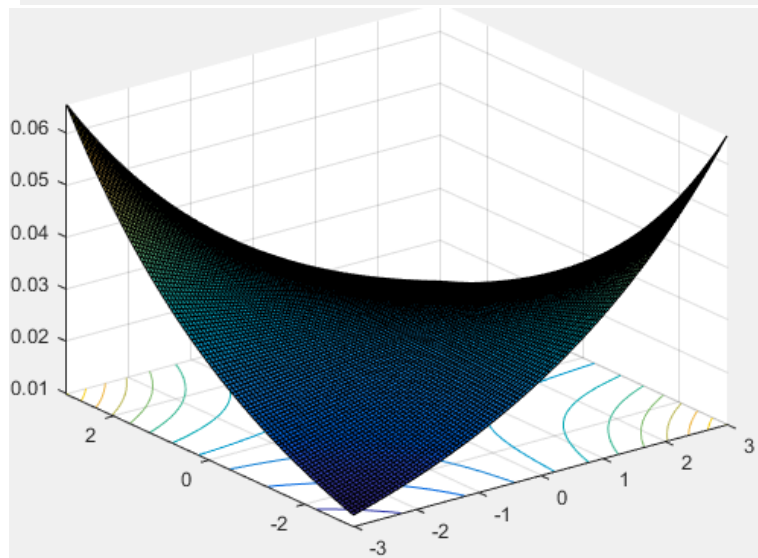
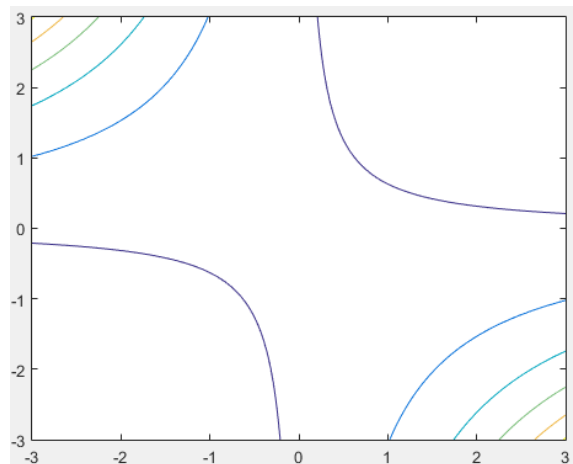
$$\bar{x} = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$$

$$M = \begin{pmatrix} a & c \\ c & b \end{pmatrix}$$

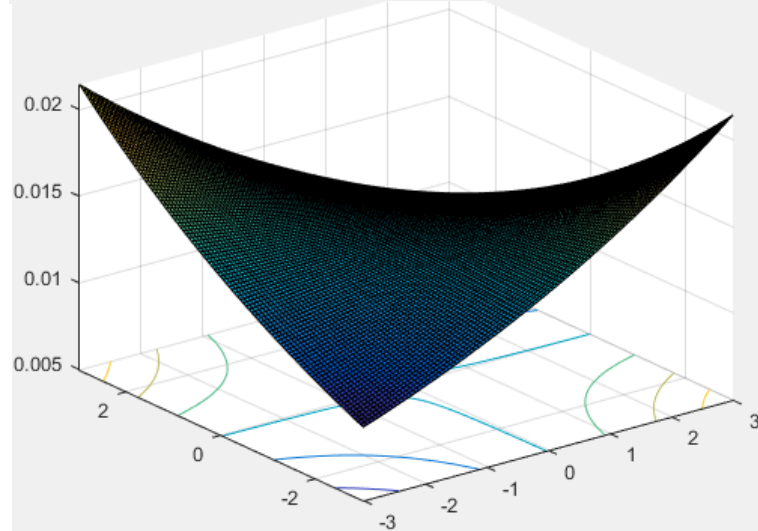
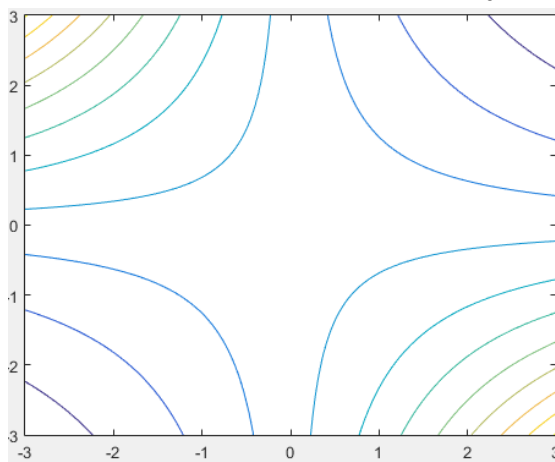
11 – תוצאות של קווי המתאר במטלב עבור בחירה של $M = \begin{bmatrix} 4 & 2 \\ 2 & 3 \end{bmatrix}$



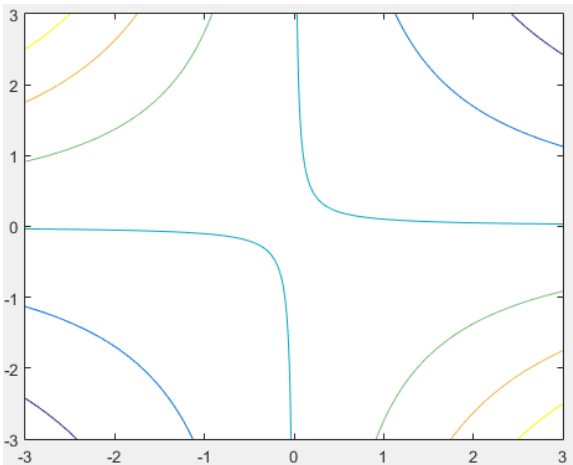
עבור $t=0.5$:



עבור $t=1$:



עבור $t=2$:



$$x^2(x+y)^2 dt$$

$$EL - \text{Equation}$$

پیش فرض ها در اینجا

2

$$L = \int_0^1 [3(u')^2 + 2u + 2x] dx$$

نکته

(1)

$$u_0 = u_1 = 1$$

در این صورت

$$EL: \frac{d}{dx} \cdot \frac{\partial L}{\partial u'} = \frac{\partial L}{\partial u} \Rightarrow u'' = 2 \Rightarrow u' = \frac{1}{3}$$

$$\Rightarrow u(x) = \frac{1}{6}x^2 + ax + b$$

$$u(0) = 1 \Rightarrow b = 1$$

$$u(1) = 1 \Rightarrow \frac{1}{6} + a + 1 = 1 \Rightarrow a = -\frac{1}{6}$$

$$\Rightarrow u(x) = \frac{1}{6}x^2 - \frac{1}{6}x + 1$$

$$L_2 = \int_1^2 \frac{(u')^2}{x^3} dx$$

$$u(1) = 0$$

$$u(2) = 1$$

(2)

$$EL \Rightarrow \frac{d}{dx} \left(\frac{2u'}{x^3} \right) = 0 \Rightarrow \frac{2u'}{x^3} = C_0 \Rightarrow u' = C_1 x^3$$

$$u = C_2 x^4 + C_3$$

$$u(1) = C_2 + C_3 = 0$$

$$u(2) = 16C_2 + C_3 = 1 \Rightarrow C_2 = \frac{1}{15}$$

$$C_3 = -\frac{1}{15}$$

$$u(x) = \frac{1}{15}x^4 - \frac{1}{15}$$

$$L_3 = \int_0^{\frac{\pi}{2\sqrt{2}}} \dot{x}^2 + \dot{y}^2 - K^2(x+y)^2 dt$$

$$x(0) = y(0) = 1$$

$$x\left(\frac{\pi}{2\sqrt{2}}\right) = y\left(\frac{\pi}{2\sqrt{2}}\right) = 4$$

(3)

$$EL: F_{2000} \frac{\partial}{\partial x} F_{2000} - \frac{\partial}{\partial y} F_{2000}$$

$$\dot{x} = \frac{1}{2} \dot{z}$$

$$F = \frac{z^2 + z_0^2}{2} - K^2 z^2$$

$$EL(P) = 0 \Rightarrow -K^2 \Rightarrow 0$$

$$z(x,y) = (x+y)^2$$

$$z_t = z_x \dot{x} + z_y \dot{y} = 2(x+y)(\dot{x} + \dot{y})$$

$$\Rightarrow (\dot{x} + \dot{y}) = \frac{1}{2(x+y)} \cdot z_t$$

$$EL: \frac{\partial}{\partial x} \cdot \frac{\partial F}{\partial z_t} = \frac{\partial F}{\partial z}$$

$$F = \frac{z_t}{2(x+y)} - K^2 z$$

$$\int_0^{\frac{\pi}{2\sqrt{K}}}$$

$$\dot{x}^2 + \dot{y}^2 - K^2(x+y)^2 dt$$

$$x(0) = y(0) = 1$$

$$x\left(\frac{\pi}{2\sqrt{K}}\right) = y\left(\frac{\pi}{2\sqrt{K}}\right) = 4$$

$$EL: \begin{cases} \frac{\partial F}{\partial x} = \frac{1}{dt} \cdot \frac{\partial F}{\partial \dot{x}} \\ \frac{\partial F}{\partial y} = \frac{1}{dt} \cdot \frac{\partial F}{\partial \dot{y}} \end{cases}$$

$$\Rightarrow \begin{cases} \ddot{x} = -K^2(x+y) \\ \ddot{y} = -K^2(x+y) \end{cases}$$

$$x(t) = \sin(\sqrt{2}Kt) + a_1x + a_2$$

$$y(t) = \sin(\sqrt{2}Kt) + b_1y + b_2$$

$$\ddot{x} = -K^2 \sin(\sqrt{2}Kt) = -K^2(x+y)$$

$$\ddot{y} = -K^2 \sin(\sqrt{2}Kt) = -K^2(x+y)$$

$$\begin{cases} x(0) = \sin(0) + a_1 + a_2 = 1 \\ y(0) = \sin(0) + b_1 + b_2 = 1 \end{cases}$$

$$\begin{cases} x\left(\frac{\pi}{2\sqrt{K}}\right) = \sin\left(\frac{\pi}{2}\right) + 4a_1 + a_2 = 4 \\ y\left(\frac{\pi}{2\sqrt{K}}\right) = \sin\left(\frac{\pi}{2}\right) + 4b_1 + b_2 = 4 \end{cases} \Rightarrow \begin{cases} 4a_1 + a_2 = 3 \\ 4b_1 + b_2 = 3 \end{cases}$$

$$\begin{aligned} 3a_1 &= 2 \Rightarrow a_1 = b_1 = \frac{2}{3} \\ 3b_1 &= 2 \Rightarrow a_2 = b_2 = \frac{1}{3} \end{aligned}$$

$$x(t) = \sin(\sqrt{2}Kt) + \frac{2}{3}x + \frac{1}{3}$$

$$y(t) = \sin(\sqrt{2}Kt) + \frac{2}{3}y + \frac{1}{3}$$

:/n.50

הקטן של הפונקציה של EL נקרא

3) 182

$$L = \int F(x, u, u_x, u_{xx}) dx$$

$$\frac{d}{d\varepsilon} \int F(x, \tilde{u}, \tilde{u}_x, \tilde{u}_{xx}) dx = \int \frac{d}{d\varepsilon} F(x, \tilde{u}, \tilde{u}_x, \tilde{u}_{xx}) dx$$

$$\tilde{u} = u + \varepsilon \eta$$

$$= \int F_{\tilde{u}} \cdot \eta + F_{\tilde{u}_x} \eta_x + F_{\tilde{u}_{xx}} \eta_{xx} dx$$

$$\varepsilon = 0 \Rightarrow \begin{aligned} \tilde{u} &= u \\ \tilde{u}_x &= u_x \\ \tilde{u}_{xx} &= u_{xx} \end{aligned}$$

$$= \int F_{\tilde{u}} \eta dx + F_{\tilde{u}_x} \eta \Big|_{x_0}^{x_1} - \int \frac{d}{dx} (F_{\tilde{u}_x}) \eta dx$$

$$+ F_{\tilde{u}_{xx}} \eta_x \Big|_{x_0}^{x_1} - \int \frac{d}{dx} (F_{\tilde{u}_{xx}}) \eta_x dx$$

$$= \int F_{\tilde{u}} \eta dx + F_{\tilde{u}_x} \eta \Big|_{x_0}^{x_1} - \int \frac{d}{dx} (F_{\tilde{u}_x}) \eta dx$$

$$+ F_{\tilde{u}_{xx}} \eta_x \Big|_{x_0}^{x_1} - \frac{d}{dx} (F_{\tilde{u}_{xx}}) \eta_x \Big|_{x_0}^{x_1} + \int \frac{d^2}{dx^2} (F_{\tilde{u}_{xx}}) \eta dx$$

0 בשר x_0, x_1 לא נבדקת - נא עת' נבדק

$$= \int (F_u - \frac{d}{dx} F_{u_x} + \frac{d^2}{dx^2} F_{u_{xx}}) \eta = 0 \quad \leftarrow \eta \text{ חי}$$

$$\textcircled{u} \quad \left[F_u - \frac{d}{dx} F_{u_x} + \frac{d^2}{dx^2} F_{u_{xx}} = 0 \right] \quad | \text{ חי}$$

$$\text{discomfort} = \int_0^T (v')^2 dt = \int_0^T (E, v, v') dt \quad : \text{10/112}$$

$$EL: \frac{d}{d\varepsilon} \frac{\partial F}{\partial v'} = \frac{\partial F}{\partial v} \Rightarrow 2\ddot{v} = 0 \quad \ddot{v} = 0 \Rightarrow v(t) = at + b$$

$$u(t) = \frac{1}{2} at^2 + bt + c$$

$$v(0) = b = v_0$$

$$v(T) = aT + v_0 = v_f \leftarrow v_f \text{ של הרכב} \quad \text{הרכב}$$

$$u(0) = c = 0$$

$$u(T) = \frac{1}{2} aT^2 + v_0 T = 0 \Rightarrow a = \frac{2(0 - v_0 T)}{T^2}$$

$$\Rightarrow v_f = \left[\frac{2(0 - v_0 T)}{T} \right] + v_0 \quad T \neq 0$$