Котелевец К.А. ВКБ21

ТВиМС

**Контрольная работа №2**

Домашняя часть

Набор данных содержит данные за 5 лет, т.е. с 05.02.2018 по 05.02.2022 в рабочие дни (1010 значений). Содержит значения цен, по которой открылись акции у компании Netflix. Данные взяты со следующего источника: <https://www.kaggle.com/datasets/jainilcoder/netflix-stock-price-prediction>

[262.0, 247.7, 266.58, 267.08, 253.85, 252.14, 257.29, 260.47, 270.03, 278.73, 277.74, 282.07, 283.88, 281.0, 288.75, 294.77, 293.1, 292.75, 284.65, 302.85, 319.88, 320.0, 322.2, 321.33, 333.56, 323.87, 318.16, 323.17, 321.42, 315.8, 313.26, 316.35, 313.07, 307.41, 309.36, 322.49, 298.39, 287.0, 291.94, 285.45, 273.63, 293.15, 289.1, 291.77, 297.68, 302.88, 309.72, 317.29, 315.99, 329.66, 336.3, 332.88, 332.22, 329.15, 319.22, 306.37, 310.0, 316.25, 311.07, 310.36, 311.65, 312.59, 308.71, 321.99, 325.9, 328.79, 331.5, 329.65, 327.25, 325.94, 326.28, 327.53, 324.9, 327.11, 334.05, 329.04, 344.34, 349.9, 351.5, 352.37, 353.8, 353.88, 362.68, 363.32, 367.78, 368.54, 358.06, 361.88, 363.6, 367.53, 384.27, 390.71, 387.72, 389.5, 415.15, 421.38, 419.98, 404.69, 393.28, 407.56, 395.0, 399.19, 385.45, 399.49, 393.8, 397.45, 415.95, 417.24, 411.34, 415.16, 409.19, 398.98, 346.95, 381.24, 371.06, 364.92, 359.15, 366.94, 357.57, 358.19, 366.85, 351.93, 331.51, 335.87, 337.23, 347.75, 342.87, 353.23, 352.21, 347.96, 346.91, 339.89, 342.09, 334.03, 329.9, 319.01, 314.64, 331.0, 338.49, 348.11, 346.0, 367.15, 367.23, 367.2, 365.0, 370.66, 366.47, 360.0, 347.44, 342.2, 352.27, 344.67, 359.08, 371.91, 368.55, 364.22, 353.67, 373.95, 370.26, 366.59, 359.0, 370.23, 373.59, 379.87, 379.24, 375.85, 384.38, 378.53, 375.88, 359.77, 345.18, 348.48, 353.52, 324.94, 339.57, 337.63, 337.24, 378.33, 360.67, 351.0, 333.1, 318.0, 332.28, 307.12, 300.51, 305.26, 275.57, 297.77, 304.59, 318.0, 311.1, 314.76, 312.9, 328.0, 311.07, 300.0, 295.0, 300.4, 285.51, 287.14, 283.79, 254.63, 274.42, 260.11, 260.55, 259.24, 271.98, 282.32, 288.0, 293.19, 288.13, 268.33, 282.48, 264.19, 274.08, 267.66, 277.64, 271.81, 266.51, 263.3, 269.96, 264.64, 263.83, 242.0, 233.92, 250.11, 257.94, 260.16, 259.28, 270.2, 281.88, 302.1, 319.98, 317.71, 314.57, 330.96, 334.24, 349.6, 354.0, 349.5, 351.97, 334.89, 328.25, 320.6, 328.72, 334.7, 335.87, 332.75, 339.68, 337.18, 342.6, 353.2, 357.0, 347.9, 338.0, 350.0, 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298.86, 306.25, 304.57, 301.61, 298.65, 295.0, 295.24, 294.54, 289.47, 295.0, 298.78, 290.82, 291.25, 285.32, 293.35, 294.81, 291.16, 285.7, 288.1, 290.61, 294.23, 294.5, 294.99, 291.56, 280.26, 268.35, 262.5, 255.71, 266.42, 266.18, 264.0, 267.35, 263.61, 267.78, 268.2, 271.99, 273.03, 270.02, 265.97, 284.8, 283.93, 283.82, 283.12, 304.49, 289.36, 272.89, 271.16, 268.06, 271.81, 270.68, 278.05, 281.87, 284.34, 291.0, 288.7, 288.0, 289.99, 288.19, 290.7, 288.73, 289.16, 295.32, 291.03, 283.25, 290.59, 296.0, 304.01, 301.01, 306.0, 309.1, 308.83, 315.0, 313.93, 315.78, 314.39, 302.22, 308.43, 305.27, 304.7, 307.35, 296.12, 294.49, 295.67, 298.5, 300.85, 307.36, 316.26, 324.5, 335.0, 337.76, 334.01, 334.6, 332.96, 329.08, 322.0, 326.1, 326.78, 323.12, 336.47, 331.49, 342.0, 337.13, 331.8, 344.4, 338.68, 343.5, 341.0, 340.0, 332.55, 326.04, 348.46, 345.95, 345.88, 349.0, 341.1, 347.39, 347.24, 361.0, 375.13, 369.6, 365.04, 365.0, 373.75, 377.18, 376.96, 381.47, 379.3, 388.12, 386.56, 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488.19, 492.5, 537.78, 532.0, 521.16, 532.6, 553.78, 545.0, 520.18, 498.4, 519.21, 503.35, 486.49, 480.62, 484.0, 499.99, 475.16, 472.51, 467.69, 489.01, 491.04, 470.53, 474.39, 489.11, 489.5, 492.57, 506.03, 516.43, 506.8, 518.72, 518.0, 533.48, 537.83, 548.81, 540.56, 562.61, 545.52, 549.5, 537.07, 528.14, 501.03, 494.69, 488.11, 487.03, 490.01, 486.36, 488.5, 502.01, 478.87, 484.93, 495.36, 506.56, 515.0, 485.54, 470.95, 483.0, 491.0, 486.77, 480.0, 480.12, 481.95, 482.0, 485.22, 490.46, 478.84, 485.13, 486.58, 490.08, 492.34, 501.62, 502.99, 497.5, 500.01, 517.9, 510.53, 494.56, 495.0, 505.44, 518.5, 520.11, 529.0, 533.2, 530.05, 527.69, 524.76, 515.12, 516.43, 519.9, 530.13, 525.53, 539.0, 521.55, 511.97, 508.28, 511.31, 507.84, 500.0, 495.5, 507.35, 500.0, 501.0, 565.42, 582.45, 582.1, 567.0, 554.73, 550.71, 535.88, 538.0, 536.79, 542.01, 550.17, 539.81, 552.26, 555.0, 546.0, 562.5, 564.44, 556.94, 557.29, 550.99, 549.0, 548.0, 534.99, 525.0, 539.8, 550.27, 546.51, 545.57, 553.34, 545.93, 521.5, 511.98, 514.46, 507.31, 513.5, 512.2, 512.5, 516.32, 524.47, 522.0, 516.4, 504.96, 509.13, 529.87, 533.78, 516.99, 502.82, 505.66, 510.51, 515.67, 529.93, 540.01, 544.81, 543.5, 551.13, 552.69, 551.05, 557.0, 554.87, 544.17, 550.54, 546.9, 554.42, 508.0, 513.82, 509.01, 506.76, 512.62, 505.2, 507.6, 505.0, 512.65, 510.78, 504.99, 495.99, 504.62, 502.0, 479.75, 486.83, 489.13, 487.86, 485.59, 488.4, 481.63, 489.55, 503.12, 501.05, 506.0, 502.34, 501.8, 504.4, 504.01, 499.82, 495.19, 492.0, 492.92, 497.0, 494.5, 487.17, 490.0, 489.68, 501.23, 495.0, 490.25, 496.4, 501.64, 498.54, 508.48, 517.96, 528.84, 528.12, 533.55, 534.06, 525.72, 535.5, 533.0, 544.24, 530.93, 531.0, 540.3, 535.76, 541.01, 553.97, 541.81, 526.05, 526.07, 526.13, 510.21, 512.16, 514.38, 518.08, 521.82, 519.96, 512.69, 519.0, 514.39, 513.0, 517.13, 524.0, 521.15, 520.0, 517.0, 511.86, 512.64, 515.24, 515.47, 520.0, 522.74, 545.09, 545.98, 551.48, 550.16, 546.16, 551.6, 557.25, 566.12, 569.0, 583.68, 585.8, 594.69, 603.84, 606.47, 598.16, 598.57, 584.89, 578.17, 584.3, 587.85, 586.79, 578.31, 579.69, 590.79, 592.5, 587.95, 589.0, 589.01, 608.05, 604.24, 613.39, 606.94, 628.18, 642.23, 634.17, 633.2, 633.02, 632.18, 632.23, 638.0, 632.1, 636.97, 625.57, 628.89, 651.81, 663.74, 673.76, 669.0, 670.95, 673.06, 689.06, 683.11, 677.27, 685.89, 663.97, 650.29, 653.7, 653.01, 650.24, 660.01, 681.24, 678.27, 690.0, 691.61, 692.35, 676.02, 658.18, 658.01, 675.0, 663.2, 668.2, 649.48, 617.1, 622.75, 606.01, 619.83, 630.0, 627.58, 616.78, 612.0, 598.71, 598.18, 597.09, 591.61, 586.43, 597.54, 603.36, 616.4, 615.0, 614.95, 610.71, 612.99, 610.01, 605.61, 599.91, 592.0, 554.34, 549.46, 538.49, 536.99, 544.27, 537.06, 517.6, 520.08, 515.0, 517.75, 400.43, 383.91, 379.14, 378.27, 382.06, 386.76, 401.97, 432.96, 448.25, 421.44, 407.31, 386.746]

**Листинг программы**

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| --- |
| from math import sqrt  import numpy as np from scipy.interpolate import interp1d import matplotlib.pyplot as plt   def calculate\_mean(data):  sum = 0  for i in range(len(data)):  sum = sum + float(data[i])  return sum / len(data)  def calculate\_dispersion(data, mean):  sum = 0  for i in range(len(data)):  sum = sum + pow((float(data[i]) - mean), 2)  return sum / len(data)  def calculate\_correct\_dispersion(dispersion, data):  return dispersion \* (len(data) / (len(data) - 1))  def calculate\_standard\_deviation(dispersion):  return sqrt(dispersion)  def variation\_range(data):  variation\_range = data.copy()  variation\_range.sort()  return variation\_range  def range\_every\_two\_odd(data):  data = [x for i, x in enumerate(data) if i % 2 != 0]  return data  def range\_every\_four\_odd(data):  data = [data[i] for i in range(0, len(data), 4)]  return data  def plot\_frequency\_polygon(data):  data\_counts = {}  for value in data:  if value in data\_counts:  data\_counts[value] += 1  else:  data\_counts[value] = 1   values = sorted(data\_counts.keys())  frequencies = [data\_counts[value] / len(data) for value in values]   f = interp1d(values, frequencies, kind='linear') *# Changed kind to 'linear'* x\_new = np.linspace(min(values), max(values), num=100)  y\_new = f(x\_new)   plt.figure(figsize=(10, 6))  plt.plot(x\_new, y\_new, '-') *# Changed '-' to specify a line plot* plt.xlabel('Значения выборки')  plt.ylabel('Значения частоты')  plt.title('Полигон частот')  plt.grid(True)  plt.show()  def plot\_histogram(data):  plt.hist(data, bins=25)  plt.xlabel('Значения выборки')  plt.ylabel('Высота')  plt.title('Гистограмма (25 отрезков)')  plt.grid(True)  plt.show()  def initialize\_data():  p = open('statistics.txt')  q = p.read().split('\n') *# читаем из файла генеральную совокупность* data = []  for i in range(len(q)):  data.append(round(float(q[i]), 3))  return data  print("Задание 1")  general1 = initialize\_data() variation\_range1 = variation\_range(general1) mean1 = calculate\_mean(variation\_range1) dispersion1 = calculate\_dispersion(variation\_range1, mean1) standard\_deviation1 = calculate\_standard\_deviation(dispersion1)  print("Генеральная совокупность: {}".format(general1)) print('Вариационный ряд Г.С.: {}'.format(variation\_range1)) print('Среднее значение Г.С.: {}'.format(mean1)) print('Дисперсия Г.С.: {}'.format(dispersion1)) print('Среднее квадратичное отклонение Г.С.: {}'.format(standard\_deviation1))  plot\_frequency\_polygon(variation\_range1) plot\_histogram(variation\_range1)   print("\nЗадание 2")  general2 = initialize\_data() selection2 = range\_every\_two\_odd(general2) variation\_range2 = variation\_range(selection2) mean2 = calculate\_mean(variation\_range2) dispersion2 = calculate\_dispersion(variation\_range2, mean2) correct\_dispersion2 = calculate\_correct\_dispersion(dispersion2, selection2) standard\_deviation2 = calculate\_standard\_deviation(dispersion2) correct\_standard\_deviation2 = calculate\_standard\_deviation(correct\_dispersion2)  print("Выборка из Генеральной Совокупности: {}".format(selection2)) print('Вариационный ряд выборки: {}'.format(variation\_range2)) print('Среднее значение выборки: {}'.format(mean2)) print('Дисперсия выборки: {}'.format(dispersion2)) print('Дисперсия исправленная: {}'.format(correct\_dispersion2)) print('Среднее квадратичное отклонение выборки: {}'.format(standard\_deviation2)) print('Среднее квадратичное отклонение исправленное: {}'.format(correct\_standard\_deviation2))  plot\_histogram(variation\_range2)  print("\nЗадание 3")  general3 = initialize\_data() selection3 = range\_every\_four\_odd(general3) variation\_range3 = variation\_range(selection3) mean3 = calculate\_mean(variation\_range3) dispersion3 = calculate\_dispersion(variation\_range3, mean3) correct\_dispersion3 = calculate\_correct\_dispersion(dispersion3, selection3) standard\_deviation3 = calculate\_standard\_deviation(dispersion3) correct\_standard\_deviation3 = calculate\_standard\_deviation(correct\_dispersion3)  print("Выборка из Генеральной Совокупности: {}".format(selection3)) print('Вариационный ряд выборки: {}'.format(variation\_range3)) print('Среднее значение выборки: {}'.format(mean3)) print('Дисперсия выборки: {}'.format(dispersion3)) print('Дисперсия исправленная: {}'.format(correct\_dispersion3)) print('Среднее квадратичное отклонение выборки: {}'.format(standard\_deviation3)) print('Среднее квадратичное отклонение исправленное: {}'.format(correct\_standard\_deviation3))  plot\_frequency\_polygon(variation\_range3) |

**Результат выполнения**

**Задание 1**

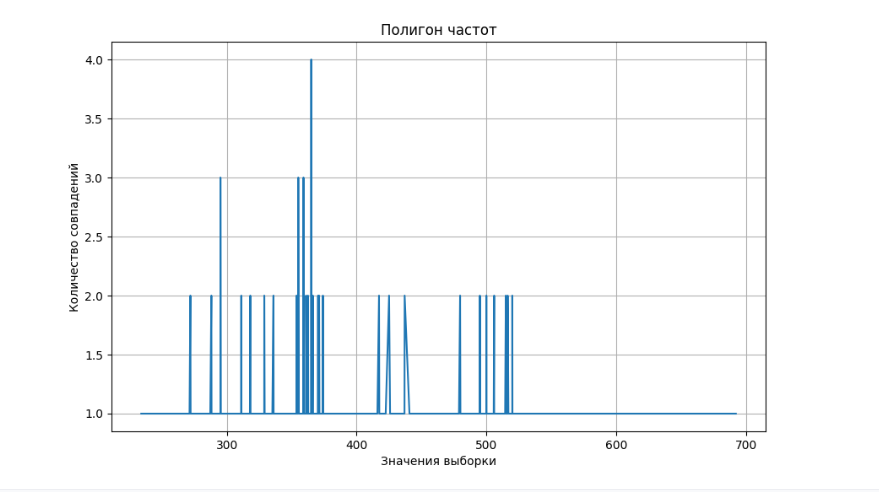
**Условие:** Генеральная совокупность: **v v v v …**

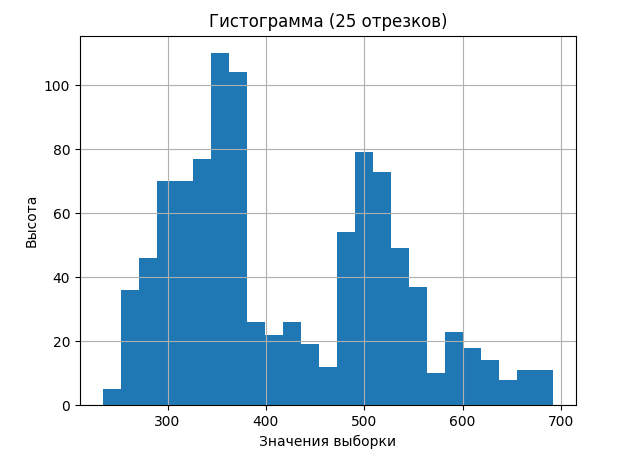
*Генеральная совокупность:* [262.0, 247.7, 266.58, 267.08, 253.85, 252.14, 257.29, 260.47, 270.03, 278.73, 277.74, 282.07, 283.88, 281.0, 288.75, 294.77, 293.1, 292.75, 284.65, 302.85, 319.88, 320.0, 322.2, 321.33, 333.56, 323.87, 318.16, 323.17, 321.42, 315.8, 313.26, 316.35, 313.07, 307.41, 309.36, 322.49, 298.39, 287.0, 291.94, 285.45, 273.63, 293.15, 289.1, 291.77, 297.68, 302.88, 309.72, 317.29, 315.99, 329.66, 336.3, 332.88, 332.22, 329.15, 319.22, 306.37, 310.0, 316.25, 311.07, 310.36, 311.65, 312.59, 308.71, 321.99, 325.9, 328.79, 331.5, 329.65, 327.25, 325.94, 326.28, 327.53, 324.9, 327.11, 334.05, 329.04, 344.34, 349.9, 351.5, 352.37, 353.8, 353.88, 362.68, 363.32, 367.78, 368.54, 358.06, 361.88, 363.6, 367.53, 384.27, 390.71, 387.72, 389.5, 415.15, 421.38, 419.98, 404.69, 393.28, 407.56, 395.0, 399.19, 385.45, 399.49, 393.8, 397.45, 415.95, 417.24, 411.34, 415.16, 409.19, 398.98, 346.95, 381.24, 371.06, 364.92, 359.15, 366.94, 357.57, 358.19, 366.85, 351.93, 331.51, 335.87, 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484.69, 496.46, 495.44, 488.19, 492.5, 537.78, 532.0, 521.16, 532.6, 553.78, 545.0, 520.18, 498.4, 519.21, 503.35, 486.49, 480.62, 484.0, 499.99, 475.16, 472.51, 467.69, 489.01, 491.04, 470.53, 474.39, 489.11, 489.5, 492.57, 506.03, 516.43, 506.8, 518.72, 518.0, 533.48, 537.83, 548.81, 540.56, 562.61, 545.52, 549.5, 537.07, 528.14, 501.03, 494.69, 488.11, 487.03, 490.01, 486.36, 488.5, 502.01, 478.87, 484.93, 495.36, 506.56, 515.0, 485.54, 470.95, 483.0, 491.0, 486.77, 480.0, 480.12, 481.95, 482.0, 485.22, 490.46, 478.84, 485.13, 486.58, 490.08, 492.34, 501.62, 502.99, 497.5, 500.01, 517.9, 510.53, 494.56, 495.0, 505.44, 518.5, 520.11, 529.0, 533.2, 530.05, 527.69, 524.76, 515.12, 516.43, 519.9, 530.13, 525.53, 539.0, 521.55, 511.97, 508.28, 511.31, 507.84, 500.0, 495.5, 507.35, 500.0, 501.0, 565.42, 582.45, 582.1, 567.0, 554.73, 550.71, 535.88, 538.0, 536.79, 542.01, 550.17, 539.81, 552.26, 555.0, 546.0, 562.5, 564.44, 556.94, 557.29, 550.99, 549.0, 548.0, 534.99, 525.0, 539.8, 550.27, 546.51, 545.57, 553.34, 545.93, 521.5, 511.98, 514.46, 507.31, 513.5, 512.2, 512.5, 516.32, 524.47, 522.0, 516.4, 504.96, 509.13, 529.87, 533.78, 516.99, 502.82, 505.66, 510.51, 515.67, 529.93, 540.01, 544.81, 543.5, 551.13, 552.69, 551.05, 557.0, 554.87, 544.17, 550.54, 546.9, 554.42, 508.0, 513.82, 509.01, 506.76, 512.62, 505.2, 507.6, 505.0, 512.65, 510.78, 504.99, 495.99, 504.62, 502.0, 479.75, 486.83, 489.13, 487.86, 485.59, 488.4, 481.63, 489.55, 503.12, 501.05, 506.0, 502.34, 501.8, 504.4, 504.01, 499.82, 495.19, 492.0, 492.92, 497.0, 494.5, 487.17, 490.0, 489.68, 501.23, 495.0, 490.25, 496.4, 501.64, 498.54, 508.48, 517.96, 528.84, 528.12, 533.55, 534.06, 525.72, 535.5, 533.0, 544.24, 530.93, 531.0, 540.3, 535.76, 541.01, 553.97, 541.81, 526.05, 526.07, 526.13, 510.21, 512.16, 514.38, 518.08, 521.82, 519.96, 512.69, 519.0, 514.39, 513.0, 517.13, 524.0, 521.15, 520.0, 517.0, 511.86, 512.64, 515.24, 515.47, 520.0, 522.74, 545.09, 545.98, 551.48, 550.16, 546.16, 551.6, 557.25, 566.12, 569.0, 583.68, 585.8, 594.69, 603.84, 606.47, 598.16, 598.57, 584.89, 578.17, 584.3, 587.85, 586.79, 578.31, 579.69, 590.79, 592.5, 587.95, 589.0, 589.01, 608.05, 604.24, 613.39, 606.94, 628.18, 642.23, 634.17, 633.2, 633.02, 632.18, 632.23, 638.0, 632.1, 636.97, 625.57, 628.89, 651.81, 663.74, 673.76, 669.0, 670.95, 673.06, 689.06, 683.11, 677.27, 685.89, 663.97, 650.29, 653.7, 653.01, 650.24, 660.01, 681.24, 678.27, 690.0, 691.61, 692.35, 676.02, 658.18, 658.01, 675.0, 663.2, 668.2, 649.48, 617.1, 622.75, 606.01, 619.83, 630.0, 627.58, 616.78, 612.0, 598.71, 598.18, 597.09, 591.61, 586.43, 597.54, 603.36, 616.4, 615.0, 614.95, 610.71, 612.99, 610.01, 605.61, 599.91, 592.0, 554.34, 549.46, 538.49, 536.99, 544.27, 537.06, 517.6, 520.08, 515.0, 517.75, 400.43, 383.91, 379.14, 378.27, 382.06, 386.76, 401.97, 432.96, 448.25, 421.44, 407.31, 386.746]

*Вариационный ряд Г.С.:* [233.92, 242.0, 247.7, 250.11, 252.14, 253.85, 254.63, 255.71, 257.29, 257.94, 259.24, 259.28, 260.11, 260.16, 260.47, 260.55, 262.0, 262.5, 263.3, 263.61, 263.83, 264.0, 264.19, 264.64, 265.97, 266.18, 266.42, 266.51, 266.58, 267.08, 267.35, 267.66, 267.78, 268.06, 268.2, 268.33, 268.35, 269.96, 270.02, 270.03, 270.2, 270.68, 271.16, 271.81, 271.81, 271.98, 271.99, 272.89, 273.03, 273.63, 274.08, 274.42, 275.57, 277.64, 277.74, 278.05, 278.73, 280.26, 281.0, 281.87, 281.88, 282.07, 282.32, 282.48, 283.12, 283.25, 283.79, 283.82, 283.88, 283.93, 284.34, 284.65, 284.8, 285.32, 285.45, 285.51, 285.7, 287.0, 287.14, 288.0, 288.0, 288.1, 288.13, 288.19, 288.7, 288.73, 288.75, 289.1, 289.16, 289.36, 289.47, 289.99, 290.59, 290.61, 290.7, 290.82, 291.0, 291.03, 291.16, 291.25, 291.56, 291.77, 291.94, 292.75, 293.1, 293.15, 293.19, 293.35, 294.23, 294.49, 294.5, 294.54, 294.77, 294.81, 294.99, 295.0, 295.0, 295.0, 295.24, 295.32, 295.67, 296.0, 296.12, 297.68, 297.77, 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512.62, 512.64, 512.65, 512.69, 513.0, 513.5, 513.82, 514.38, 514.39, 514.46, 515.0, 515.0, 515.12, 515.24, 515.47, 515.67, 516.3, 516.32, 516.4, 516.43, 516.43, 516.99, 517.0, 517.08, 517.13, 517.6, 517.75, 517.9, 517.96, 518.0, 518.08, 518.5, 518.72, 519.0, 519.21, 519.73, 519.9, 519.96, 520.0, 520.0, 520.08, 520.11, 520.18, 521.15, 521.16, 521.5, 521.55, 521.82, 522.0, 522.74, 524.0, 524.47, 524.76, 525.0, 525.53, 525.72, 526.05, 526.07, 526.13, 526.48, 527.69, 528.12, 528.14, 528.84, 529.0, 529.87, 529.93, 530.05, 530.13, 530.93, 531.0, 532.0, 532.6, 533.0, 533.2, 533.48, 533.55, 533.78, 534.06, 534.99, 535.5, 535.76, 535.88, 536.79, 536.99, 537.06, 537.07, 537.78, 537.83, 538.0, 538.49, 539.0, 539.8, 539.81, 540.01, 540.3, 540.56, 541.01, 541.81, 542.01, 543.5, 544.17, 544.24, 544.27, 544.81, 545.0, 545.09, 545.52, 545.57, 545.93, 545.98, 546.0, 546.16, 546.51, 546.9, 548.0, 548.81, 549.0, 549.46, 549.5, 550.16, 550.17, 550.27, 550.54, 550.71, 550.99, 551.05, 551.13, 551.48, 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*Среднее значение Г.С.:* 419.0276792079207

*Дисперсия Г.С.:* 11758.101191303023

*Среднее квадратичное отклонение Г.С.:* 108.43477851364396



**Задание 2**

**Условие:** выборка – четные элементы: **\_ v \_ v \_ v …**

*Выборка из Генеральной Совокупности:* [247.7, 267.08, 252.14, 260.47, 278.73, 282.07, 281.0, 294.77, 292.75, 302.85, 320.0, 321.33, 323.87, 323.17, 315.8, 316.35, 307.41, 322.49, 287.0, 285.45, 293.15, 291.77, 302.88, 317.29, 329.66, 332.88, 329.15, 306.37, 316.25, 310.36, 312.59, 321.99, 328.79, 329.65, 325.94, 327.53, 327.11, 329.04, 349.9, 352.37, 353.88, 363.32, 368.54, 361.88, 367.53, 390.71, 389.5, 421.38, 404.69, 407.56, 399.19, 399.49, 397.45, 417.24, 415.16, 398.98, 381.24, 364.92, 366.94, 358.19, 351.93, 335.87, 347.75, 353.23, 347.96, 339.89, 334.03, 319.01, 331.0, 348.11, 367.15, 367.2, 370.66, 360.0, 342.2, 344.67, 371.91, 364.22, 373.95, 366.59, 370.23, 379.87, 375.85, 378.53, 359.77, 348.48, 324.94, 337.63, 378.33, 351.0, 318.0, 307.12, 305.26, 297.77, 318.0, 314.76, 328.0, 300.0, 300.4, 287.14, 254.63, 260.11, 259.24, 282.32, 293.19, 268.33, 264.19, 267.66, 271.81, 263.3, 264.64, 242.0, 250.11, 260.16, 270.2, 302.1, 317.71, 330.96, 349.6, 349.5, 334.89, 320.6, 334.7, 332.75, 337.18, 353.2, 347.9, 350.0, 357.3, 358.47, 364.85, 360.34, 362.98, 362.47, 359.72, 353.6, 345.75, 359.37, 360.5, 362.47, 358.91, 375.95, 367.87, 354.49, 359.0, 369.26, 369.0, 360.54, 365.0, 350.71, 365.05, 359.7, 381.07, 368.35, 369.56, 378.0, 377.69, 367.92, 361.62, 348.71, 356.37, 351.23, 358.01, 355.41, 353.6, 347.22, 345.0, 354.84, 363.65, 351.82, 341.63, 355.57, 365.91, 370.27, 361.6, 370.26, 374.89, 378.29, 379.06, 381.1, 372.94, 366.25, 323.4, 311.44, 318.86, 335.98, 325.16, 317.49, 310.58, 311.03, 305.46, 308.01, 298.86, 304.57, 298.65, 295.24, 289.47, 298.78, 291.25, 293.35, 291.16, 288.1, 294.23, 294.99, 280.26, 262.5, 266.42, 264.0, 263.61, 268.2, 273.03, 265.97, 283.93, 283.12, 289.36, 271.16, 271.81, 278.05, 284.34, 288.7, 289.99, 290.7, 289.16, 291.03, 290.59, 304.01, 306.0, 308.83, 313.93, 314.39, 308.43, 304.7, 296.12, 295.67, 300.85, 316.26, 335.0, 334.01, 332.96, 322.0, 326.78, 336.47, 342.0, 331.8, 338.68, 341.0, 332.55, 348.46, 345.88, 341.1, 347.24, 375.13, 365.04, 373.75, 376.96, 379.3, 386.56, 364.76, 366.31, 364.21, 381.03, 381.0, 343.86, 358.92, 330.51, 306.19, 324.33, 347.89, 361.02, 359.09, 367.93, 364.08, 365.22, 374.01, 371.31, 413.0, 431.0, 444.77, 419.26, 425.0, 399.53, 415.1, 427.56, 436.89, 436.33, 435.69, 440.7, 453.4, 448.56, 427.77, 417.24, 418.83, 426.95, 407.29, 421.65, 428.2, 421.4, 441.82, 449.12, 466.5, 458.86, 445.23, 454.0, 480.77, 498.58, 519.73, 517.08, 526.48, 489.14, 492.19, 468.77, 496.02, 480.71, 490.86, 508.68, 505.45, 479.75, 478.4, 484.19, 493.93, 496.46, 488.19, 537.78, 521.16, 553.78, 520.18, 519.21, 486.49, 484.0, 475.16, 467.69, 491.04, 474.39, 489.5, 506.03, 506.8, 518.0, 537.83, 540.56, 545.52, 537.07, 501.03, 488.11, 490.01, 488.5, 478.87, 495.36, 515.0, 470.95, 491.0, 480.0, 481.95, 485.22, 478.84, 486.58, 492.34, 502.99, 500.01, 510.53, 495.0, 518.5, 529.0, 530.05, 524.76, 516.43, 530.13, 539.0, 511.97, 511.31, 500.0, 507.35, 501.0, 582.45, 567.0, 550.71, 538.0, 542.01, 539.81, 555.0, 562.5, 556.94, 550.99, 548.0, 525.0, 550.27, 545.57, 545.93, 511.98, 507.31, 512.2, 516.32, 522.0, 504.96, 529.87, 516.99, 505.66, 515.67, 540.01, 543.5, 552.69, 557.0, 544.17, 546.9, 508.0, 509.01, 512.62, 507.6, 512.65, 504.99, 504.62, 479.75, 489.13, 485.59, 481.63, 503.12, 506.0, 501.8, 504.01, 495.19, 492.92, 494.5, 490.0, 501.23, 490.25, 501.64, 508.48, 528.84, 533.55, 525.72, 533.0, 530.93, 540.3, 541.01, 541.81, 526.07, 510.21, 514.38, 521.82, 512.69, 514.39, 517.13, 521.15, 517.0, 512.64, 515.47, 522.74, 545.98, 550.16, 551.6, 566.12, 583.68, 594.69, 606.47, 598.57, 578.17, 587.85, 578.31, 590.79, 587.95, 589.01, 604.24, 606.94, 642.23, 633.2, 632.18, 638.0, 636.97, 628.89, 663.74, 669.0, 673.06, 683.11, 685.89, 650.29, 653.01, 660.01, 678.27, 691.61, 676.02, 658.01, 663.2, 649.48, 622.75, 619.83, 627.58, 612.0, 598.18, 591.61, 597.54, 616.4, 614.95, 612.99, 605.61, 592.0, 549.46, 536.99, 537.06, 520.08, 517.75, 383.91, 378.27, 386.76, 432.96, 421.44, 386.746]

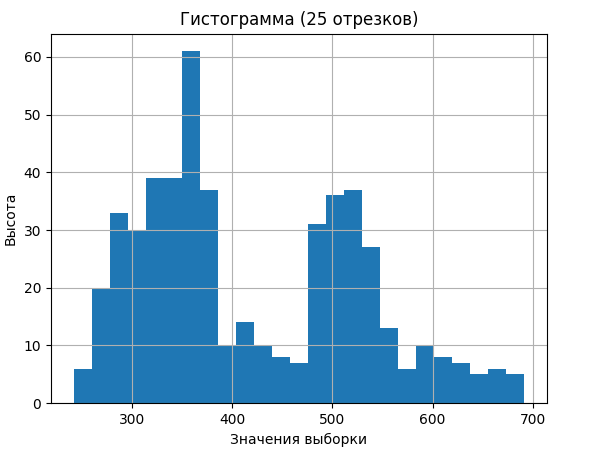
*Вариационный ряд выборки*: [242.0, 247.7, 250.11, 252.14, 254.63, 259.24, 260.11, 260.16, 260.47, 262.5, 263.3, 263.61, 264.0, 264.19, 264.64, 265.97, 266.42, 267.08, 267.66, 268.2, 268.33, 270.2, 271.16, 271.81, 271.81, 273.03, 278.05, 278.73, 280.26, 281.0, 282.07, 282.32, 283.12, 283.93, 284.34, 285.45, 287.0, 287.14, 288.1, 288.7, 289.16, 289.36, 289.47, 289.99, 290.59, 290.7, 291.03, 291.16, 291.25, 291.77, 292.75, 293.15, 293.19, 293.35, 294.23, 294.77, 294.99, 295.24, 295.67, 296.12, 297.77, 298.65, 298.78, 298.86, 300.0, 300.4, 300.85, 302.1, 302.85, 302.88, 304.01, 304.57, 304.7, 305.26, 305.46, 306.0, 306.19, 306.37, 307.12, 307.41, 308.01, 308.43, 308.83, 310.36, 310.58, 311.03, 311.44, 312.59, 313.93, 314.39, 314.76, 315.8, 316.25, 316.26, 316.35, 317.29, 317.49, 317.71, 318.0, 318.0, 318.86, 319.01, 320.0, 320.6, 321.33, 321.99, 322.0, 322.49, 323.17, 323.4, 323.87, 324.33, 324.94, 325.16, 325.94, 326.78, 327.11, 327.53, 328.0, 328.79, 329.04, 329.15, 329.65, 329.66, 330.51, 330.96, 331.0, 331.8, 332.55, 332.75, 332.88, 332.96, 334.01, 334.03, 334.7, 334.89, 335.0, 335.87, 335.98, 336.47, 337.18, 337.63, 338.68, 339.89, 341.0, 341.1, 341.63, 342.0, 342.2, 343.86, 344.67, 345.0, 345.75, 345.88, 347.22, 347.24, 347.75, 347.89, 347.9, 347.96, 348.11, 348.46, 348.48, 348.71, 349.5, 349.6, 349.9, 350.0, 350.71, 351.0, 351.23, 351.82, 351.93, 352.37, 353.2, 353.23, 353.6, 353.6, 353.88, 354.49, 354.84, 355.41, 355.57, 356.37, 357.3, 358.01, 358.19, 358.47, 358.91, 358.92, 359.0, 359.09, 359.37, 359.7, 359.72, 359.77, 360.0, 360.34, 360.5, 360.54, 361.02, 361.6, 361.62, 361.88, 362.47, 362.47, 362.98, 363.32, 363.65, 364.08, 364.21, 364.22, 364.76, 364.85, 364.92, 365.0, 365.04, 365.05, 365.22, 365.91, 366.25, 366.31, 366.59, 366.94, 367.15, 367.2, 367.53, 367.87, 367.92, 367.93, 368.35, 368.54, 369.0, 369.26, 369.56, 370.23, 370.26, 370.27, 370.66, 371.31, 371.91, 372.94, 373.75, 373.95, 374.01, 374.89, 375.13, 375.85, 375.95, 376.96, 377.69, 378.0, 378.27, 378.29, 378.33, 378.53, 379.06, 379.3, 379.87, 381.0, 381.03, 381.07, 381.1, 381.24, 383.91, 386.56, 386.746, 386.76, 389.5, 390.71, 397.45, 398.98, 399.19, 399.49, 399.53, 404.69, 407.29, 407.56, 413.0, 415.1, 415.16, 417.24, 417.24, 418.83, 419.26, 421.38, 421.4, 421.44, 421.65, 425.0, 426.95, 427.56, 427.77, 428.2, 431.0, 432.96, 435.69, 436.33, 436.89, 440.7, 441.82, 444.77, 445.23, 448.56, 449.12, 453.4, 454.0, 458.86, 466.5, 467.69, 468.77, 470.95, 474.39, 475.16, 478.4, 478.84, 478.87, 479.75, 479.75, 480.0, 480.71, 480.77, 481.63, 481.95, 484.0, 484.19, 485.22, 485.59, 486.49, 486.58, 488.11, 488.19, 488.5, 489.13, 489.14, 489.5, 490.0, 490.01, 490.25, 490.86, 491.0, 491.04, 492.19, 492.34, 492.92, 493.93, 494.5, 495.0, 495.19, 495.36, 496.02, 496.46, 498.58, 500.0, 500.01, 501.0, 501.03, 501.23, 501.64, 501.8, 502.99, 503.12, 504.01, 504.62, 504.96, 504.99, 505.45, 505.66, 506.0, 506.03, 506.8, 507.31, 507.35, 507.6, 508.0, 508.48, 508.68, 509.01, 510.21, 510.53, 511.31, 511.97, 511.98, 512.2, 512.62, 512.64, 512.65, 512.69, 514.38, 514.39, 515.0, 515.47, 515.67, 516.32, 516.43, 516.99, 517.0, 517.08, 517.13, 517.75, 518.0, 518.5, 519.21, 519.73, 520.08, 520.18, 521.15, 521.16, 521.82, 522.0, 522.74, 524.76, 525.0, 525.72, 526.07, 526.48, 528.84, 529.0, 529.87, 530.05, 530.13, 530.93, 533.0, 533.55, 536.99, 537.06, 537.07, 537.78, 537.83, 538.0, 539.0, 539.81, 540.01, 540.3, 540.56, 541.01, 541.81, 542.01, 543.5, 544.17, 545.52, 545.57, 545.93, 545.98, 546.9, 548.0, 549.46, 550.16, 550.27, 550.71, 550.99, 551.6, 552.69, 553.78, 555.0, 556.94, 557.0, 562.5, 566.12, 567.0, 578.17, 578.31, 582.45, 583.68, 587.85, 587.95, 589.01, 590.79, 591.61, 592.0, 594.69, 597.54, 598.18, 598.57, 604.24, 605.61, 606.47, 606.94, 612.0, 612.99, 614.95, 616.4, 619.83, 622.75, 627.58, 628.89, 632.18, 633.2, 636.97, 638.0, 642.23, 649.48, 650.29, 653.01, 658.01, 660.01, 663.2, 663.74, 669.0, 673.06, 676.02, 678.27, 683.11, 685.89, 691.61]

*Среднее значение выборки:* 419.0227841584159

*Дисперсия выборки:* 11704.28471833955

*Дисперсия исправленная:* 11727.507505479112

*Среднее квадратичное отклонение выборки:* 108.18634256845709

*Среднее квадратичное отклонение исправленное:* 108.2936171040524

**Задание 3**

**Условие:** выборка через каждые 4 элемента: **v \_ \_ \_ \_ v …**

*Выборка из Генеральной Совокупности:* [262.0, 252.14, 277.74, 294.77, 319.88, 323.87, 313.26, 322.49, 273.63, 302.88, 336.3, 306.37, 311.65, 328.79, 326.28, 329.04, 353.8, 368.54, 384.27, 421.38, 395.0, 397.45, 409.19, 364.92, 366.85, 347.75, 346.91, 319.01, 346.0, 370.66, 352.27, 364.22, 359.0, 375.85, 345.18, 337.63, 333.1, 305.26, 311.1, 300.0, 283.79, 259.24, 288.13, 267.66, 269.96, 250.11, 281.88, 330.96, 351.97, 334.7, 342.6, 350.0, 355.8, 362.98, 351.46, 359.37, 366.4, 367.87, 366.25, 360.54, 355.0, 381.07, 374.0, 367.92, 343.34, 358.01, 350.55, 354.84, 347.23, 365.91, 363.2, 378.29, 378.68, 323.4, 328.79, 317.49, 313.74, 298.86, 295.0, 298.78, 294.81, 294.23, 268.35, 264.0, 271.99, 283.93, 272.89, 278.05, 288.0, 289.16, 296.0, 308.83, 302.22, 296.12, 307.36, 334.01, 326.1, 342.0, 343.5, 348.46, 347.39, 365.04, 381.47, 364.76, 373.11, 343.86, 306.63, 347.89, 363.0, 365.22, 397.5, 444.77, 419.99, 427.56, 442.0, 453.4, 410.38, 426.95, 436.0, 441.82, 468.54, 454.0, 508.4, 526.48, 491.13, 480.71, 504.11, 478.4, 484.69, 537.78, 545.0, 486.49, 472.51, 474.39, 516.43, 537.83, 549.5, 488.11, 502.01, 515.0, 486.77, 485.22, 490.08, 500.01, 505.44, 530.05, 519.9, 511.97, 495.5, 582.45, 535.88, 539.81, 564.44, 548.0, 546.51, 511.98, 512.5, 504.96, 502.82, 540.01, 551.05, 546.9, 506.76, 512.65, 502.0, 485.59, 501.05, 504.01, 497.0, 501.23, 498.54, 533.55, 544.24, 541.01, 526.13, 521.82, 513.0, 517.0, 520.0, 550.16, 569.0, 606.47, 584.3, 590.79, 608.05, 642.23, 632.23, 628.89, 670.95, 685.89, 650.24, 691.61, 675.0, 622.75, 616.78, 591.61, 615.0, 605.61, 538.49, 520.08, 379.14, 432.96]

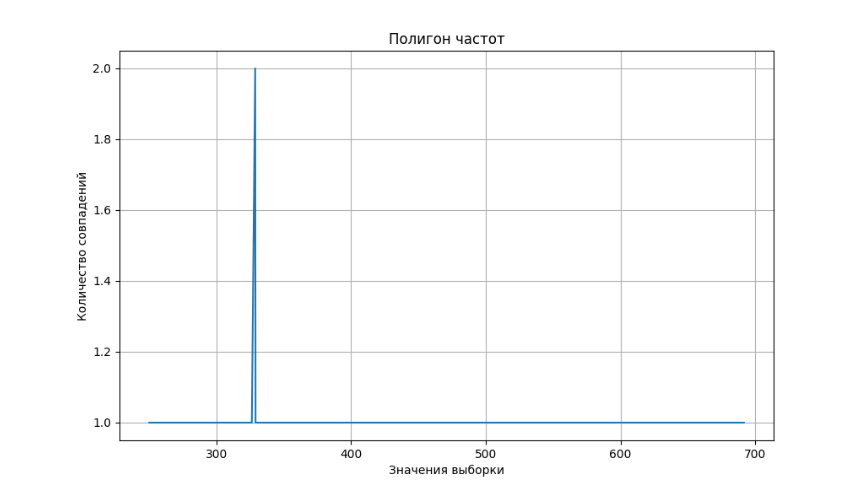
*Вариационный ряд выборки:* [250.11, 252.14, 259.24, 262.0, 264.0, 267.66, 268.35, 269.96, 271.99, 272.89, 273.63, 277.74, 278.05, 281.88, 283.79, 283.93, 288.0, 288.13, 289.16, 294.23, 294.77, 294.81, 295.0, 296.0, 296.12, 298.78, 298.86, 300.0, 302.22, 302.88, 305.26, 306.37, 306.63, 307.36, 308.83, 311.1, 311.65, 313.26, 313.74, 317.49, 319.01, 319.88, 322.49, 323.4, 323.87, 326.1, 326.28, 328.79, 328.79, 329.04, 330.96, 333.1, 334.01, 334.7, 336.3, 337.63, 342.0, 342.6, 343.34, 343.5, 343.86, 345.18, 346.0, 346.91, 347.23, 347.39, 347.75, 347.89, 348.46, 350.0, 350.55, 351.46, 351.97, 352.27, 353.8, 354.84, 355.0, 355.8, 358.01, 359.0, 359.37, 360.54, 362.98, 363.0, 363.2, 364.22, 364.76, 364.92, 365.04, 365.22, 365.91, 366.25, 366.4, 366.85, 367.87, 367.92, 368.54, 370.66, 373.11, 374.0, 375.85, 378.29, 378.68, 379.14, 381.07, 381.47, 384.27, 395.0, 397.45, 397.5, 409.19, 410.38, 419.99, 421.38, 426.95, 427.56, 432.96, 436.0, 441.82, 442.0, 444.77, 453.4, 454.0, 468.54, 472.51, 474.39, 478.4, 480.71, 484.69, 485.22, 485.59, 486.49, 486.77, 488.11, 490.08, 491.13, 495.5, 497.0, 498.54, 500.01, 501.05, 501.23, 502.0, 502.01, 502.82, 504.01, 504.11, 504.96, 505.44, 506.76, 508.4, 511.97, 511.98, 512.5, 512.65, 513.0, 515.0, 516.43, 517.0, 519.9, 520.0, 520.08, 521.82, 526.13, 526.48, 530.05, 533.55, 535.88, 537.78, 537.83, 538.49, 539.81, 540.01, 541.01, 544.24, 545.0, 546.51, 546.9, 548.0, 549.5, 550.16, 551.05, 564.44, 569.0, 582.45, 584.3, 590.79, 591.61, 605.61, 606.47, 608.05, 615.0, 616.78, 622.75, 628.89, 632.23, 642.23, 650.24, 670.95, 675.0, 685.89, 691.61]

*Среднее значение выборки:* 419.25009900990096

*Дисперсия выборки:* 11943.472899000099

*Дисперсия исправленная:* 12002.893162179205

*Среднее квадратичное отклонение выборки:* 109.28619720257494

*Среднее квадратичное отклонение исправленное:* 109.55771612341691

**Аудиторная часть**

*Выборка из Генеральной Совокупности*: [247.7, 252.14, 278.73, 281.0, 292.75, 320.0, 323.87, 315.8, 307.41, 287.0, 293.15, 302.88, 329.66, 329.15, 316.25, 312.59, 328.79, 325.94, 327.11, 349.9, 353.88, 368.54, 367.53, 389.5, 404.69, 399.19, 397.45, 415.16, 381.24, 366.94, 351.93, 347.75, 347.96, 334.03, 331.0, 367.15, 370.66, 342.2, 371.91, 373.95, 370.23, 375.85, 359.77, 324.94, 378.33, 318.0, 305.26, 318.0, 328.0, 300.4, 254.63, 259.24, 293.19, 264.19, 271.81, 264.64, 250.11, 270.2, 317.71, 349.6, 334.89, 334.7, 337.18, 347.9, 357.3, 364.85, 362.98, 359.72, 345.75, 360.5, 358.91, 367.87, 359.0, 369.0, 365.0, 365.05, 381.07, 369.56, 377.69, 361.62, 356.37, 358.01, 353.6, 345.0, 363.65, 341.63, 365.91, 361.6, 374.89, 379.06, 372.94, 323.4, 318.86, 325.16, 310.58, 305.46, 298.86, 298.65, 289.47, 291.25, 291.16, 294.23, 280.26, 266.42, 263.61, 273.03, 283.93, 289.36, 271.81, 284.34, 289.99, 289.16, 290.59, 306.0, 313.93, 308.43, 296.12, 300.85, 335.0, 332.96, 326.78, 342.0, 338.68, 332.55, 345.88, 347.24, 365.04, 376.96, 386.56, 366.31, 381.03, 343.86, 330.51, 324.33, 361.02, 367.93, 365.22, 371.31, 431.0, 419.26, 399.53, 427.56, 436.33, 440.7, 448.56, 417.24, 426.95, 421.65, 421.4, 449.12, 458.86, 454.0, 498.58, 517.08, 489.14, 468.77, 480.71, 508.68, 479.75, 484.19, 496.46, 537.78, 553.78, 519.21, 484.0, 467.69, 474.39, 506.03, 518.0, 540.56, 537.07, 488.11, 488.5, 495.36, 470.95, 480.0, 485.22, 486.58, 502.99, 510.53, 518.5, 530.05, 516.43, 539.0, 511.31, 507.35, 582.45, 550.71, 542.01, 555.0, 556.94, 548.0, 550.27, 545.93, 507.31, 516.32, 504.96, 516.99, 515.67, 543.5, 557.0, 546.9, 509.01, 507.6, 504.99, 479.75, 485.59, 503.12, 501.8, 495.19, 494.5, 501.23, 501.64, 528.84, 525.72, 530.93, 541.01, 526.07, 514.38, 512.69, 517.13, 517.0, 515.47, 545.98, 551.6, 583.68, 606.47, 578.17, 578.31, 587.95, 604.24, 642.23, 632.18, 636.97, 663.74, 673.06, 685.89, 653.01, 678.27, 676.02, 663.2, 622.75, 627.58, 598.18, 597.54, 614.95, 605.61, 549.46, 537.06, 517.75, 378.27, 432.96, 386.746]

*Вариационный ряд выборки*: [247.7, 250.11, 252.14, 254.63, 259.24, 263.61, 264.19, 264.64, 266.42, 270.2, 271.81, 271.81, 273.03, 278.73, 280.26, 281.0, 283.93, 284.34, 287.0, 289.16, 289.36, 289.47, 289.99, 290.59, 291.16, 291.25, 292.75, 293.15, 293.19, 294.23, 296.12, 298.65, 298.86, 300.4, 300.85, 302.88, 305.26, 305.46, 306.0, 307.41, 308.43, 310.58, 312.59, 313.93, 315.8, 316.25, 317.71, 318.0, 318.0, 318.86, 320.0, 323.4, 323.87, 324.33, 324.94, 325.16, 325.94, 326.78, 327.11, 328.0, 328.79, 329.15, 329.66, 330.51, 331.0, 332.55, 332.96, 334.03, 334.7, 334.89, 335.0, 337.18, 338.68, 341.63, 342.0, 342.2, 343.86, 345.0, 345.75, 345.88, 347.24, 347.75, 347.9, 347.96, 349.6, 349.9, 351.93, 353.6, 353.88, 356.37, 357.3, 358.01, 358.91, 359.0, 359.72, 359.77, 360.5, 361.02, 361.6, 361.62, 362.98, 363.65, 364.85, 365.0, 365.04, 365.05, 365.22, 365.91, 366.31, 366.94, 367.15, 367.53, 367.87, 367.93, 368.54, 369.0, 369.56, 370.23, 370.66, 371.31, 371.91, 372.94, 373.95, 374.89, 375.85, 376.96, 377.69, 378.27, 378.33, 379.06, 381.03, 381.07, 381.24, 386.56, 386.746, 389.5, 397.45, 399.19, 399.53, 404.69, 415.16, 417.24, 419.26, 421.4, 421.65, 426.95, 427.56, 431.0, 432.96, 436.33, 440.7, 448.56, 449.12, 454.0, 458.86, 467.69, 468.77, 470.95, 474.39, 479.75, 479.75, 480.0, 480.71, 484.0, 484.19, 485.22, 485.59, 486.58, 488.11, 488.5, 489.14, 494.5, 495.19, 495.36, 496.46, 498.58, 501.23, 501.64, 501.8, 502.99, 503.12, 504.96, 504.99, 506.03, 507.31, 507.35, 507.6, 508.68, 509.01, 510.53, 511.31, 512.69, 514.38, 515.47, 515.67, 516.32, 516.43, 516.99, 517.0, 517.08, 517.13, 517.75, 518.0, 518.5, 519.21, 525.72, 526.07, 528.84, 530.05, 530.93, 537.06, 537.07, 537.78, 539.0, 540.56, 541.01, 542.01, 543.5, 545.93, 545.98, 546.9, 548.0, 549.46, 550.27, 550.71, 551.6, 553.78, 555.0, 556.94, 557.0, 578.17, 578.31, 582.45, 583.68, 587.95, 597.54, 598.18, 604.24, 605.61, 606.47, 614.95, 622.75, 627.58, 632.18, 636.97, 642.23, 653.01, 663.2, 663.74, 673.06, 676.02, 678.27, 685.89]

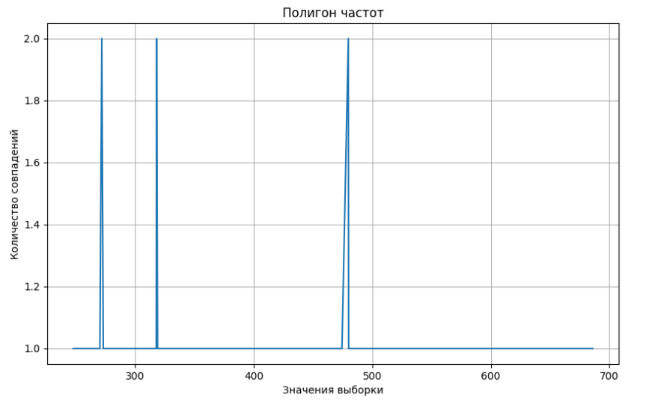
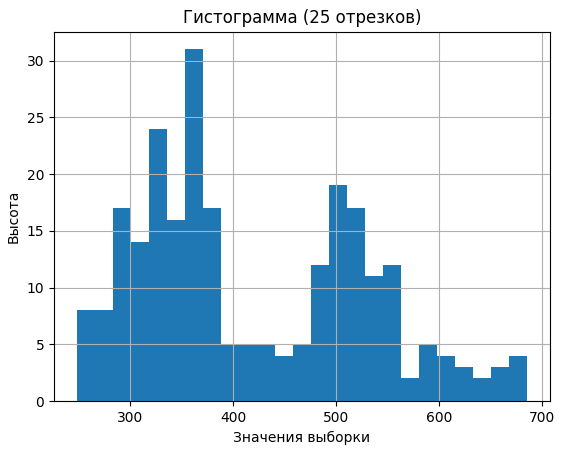
*Среднее значение выборки:* 419.11547826086957

*Дисперсия выборки:* 11797.816667996563

*Дисперсия исправленная:* 11844.633400806073

*Среднее квадратичное отклонение выборки:* 108.61775484697041

*Среднее квадратичное отклонение исправленное:* 108.83305288746647

n = 253

Листинг программы:

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| --- |
| from math import sqrt  import numpy as np from scipy.interpolate import interp1d import matplotlib.pyplot as plt   def calculate\_mean(data): *# Среднее арифметическое из выборки ряда* sum = 0  for i in range(len(data)):  sum = sum + float(data[i])  return sum / len(data)  def calculate\_dispersion(data, mean): *# Дисперсия из выборки ряда* sum = 0  for i in range(len(data)):  sum = sum + pow((float(data[i]) - mean), 2)  return sum / len(data)  def calculate\_correct\_dispersion(dispersion, data): *# Исправленная дисперсия* return dispersion \* (len(data) / (len(data) - 1))  def calculate\_standard\_deviation(dispersion): *# Стандартное отклонение* return sqrt(dispersion)  def variation\_range(data): *# Вариационный ряд* variation\_range = data.copy()  variation\_range.sort()  return variation\_range  def range\_every\_three\_odd(data):data = [data[i] for i in range(1, len(data), 4)]  return data    def initialize\_data(): *# Инициализация данных из файла* p = open('statistics.txt')  q = p.read().split('\n')  data = []  for i in range(len(q)):  data.append(round(float(q[i]), 3))  return data  general = initialize\_data() selection = range\_every\_four\_odd(general) variation\_range = variation\_range(selection) mean = calculate\_mean(variation\_range) dispersion = calculate\_dispersion(variation\_range, mean) correct\_dispersion = calculate\_correct\_dispersion(dispersion, selection) standard\_deviation = calculate\_standard\_deviation(dispersion) correct\_standard\_deviation = calculate\_standard\_deviation(correct\_dispersion)  print("Выборка из Генеральной Совокупности: {}".format(selection)) print('Вариационный ряд выборки: {}'.format(variation\_range)) print('Среднее значение выборки: {}'.format(mean)) print('Дисперсия выборки: {}'.format(dispersion)) print('Дисперсия исправленная: {}'.format(correct\_dispersion)) print('Среднее квадратичное отклонение выборки: {}'.format(standard\_deviation)) print('Среднее квадратичное отклонение исправленное: {}'.format(correct\_standard\_deviation))    print("n = ", len(selection)) |