NRU ITMO
SEaCT
Programming

Laboratory Work №1

Variant 311607

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1 Problems

1. Create w - int[17], x - double[17], w_1 - double[17][17].
2. Fill arrays this way:
   - $\forall i \in [0..16],\ w[i] = 17 - i$
   - $\forall i \in [0..16],\ x[i] = rnd(-13.0, 4.0)$
   - $\forall i : w[i] = 3 \rightarrow \forall j, w_1[i][j] = \arcsin(\frac{1}{e^{3(\tan^2(x)+1)^{\tan(x^{2x})}}})$
   - $\forall i : w[i] \in \{1, 9, 10, 12, 13, 14, 15, 16\} \rightarrow$
     $\rightarrow \forall j, w_1[i][j] = (\arcsin(\frac{x-4.5}{17})^{(\frac{\frac{2}{3}+\sqrt{3}x}{0.5})})\frac{\sqrt[3]{\arctan(\frac{x-4.5}{17})}}{2}$
   - else: $\forall j, w_1[i][j] = ((\frac{(\arcsin(\frac{x-4.5}{17}))^3}{1}/4)^{(\frac{\sqrt[3]{x}}{2})^3})^{\frac{1-\frac{\frac{1}{2}-\sin(e^x)}{4}/(\frac{x}{3-x})^2}{\arcsin(0.4\times e^{-|x|})}}$

2 Code

```
public class Main {
  static final int n = 17;
  static int[] w;
  static double[] x;
  static double[][] w1;

  static void print(double[][] a) {
    for (int i = 0; i < n; i++) {
      for (int j = 0; j < n; j++) {
        System.out.printf("%7.5f", a[i][j]);
        System.out.print(' ');
      }
      System.out.println();
    }
  }

  public static void main(String[] args) {
    exFirst();
    exSecond();
    exThird();
    print(w1);
  }

  static void exFirst() {
    w = new int[n];
    for (int i = 0; i < n; i++) {
      w[i] = 17 - i;
    }
  }

  static void exSecond() {
    x = new double[n];
    for (int i = 0; i < n; i++) {
      x[i] = (Math.random() * n) - 13;
    }
  }

  static void exThird() {
    w1 = new double[n][n];
    for (int i = 0; i < n; i++) {
      for (int j = 0; j < n; j++) {
        w1[i][j] = count(w1[i][j], i, j);
      }
    }
  }
}
```

```
    static double count(double e_w1, int i, int j) {
      e_w1 = switch (w[i]) {
        case 3 -> firstFunc(x[j]);
        case 1, 9, 10, 12, 13, 14, 15, 16 -> secFunc(x[j]);
        default -> thirdFunc(x[j]);
      };
      return e_w1;
    }

    static double firstFunc(double x) {
      double upper_power = Math.tan(Math.pow(x, 2*x));
      double lower_power = Math.pow((3*(Math.pow(Math.tan(x)
          ,2)+1)), upper_power);
      double denom = Math.exp(lower_power);
      double ans = Math.asin(1.0/denom);
      return ans;
    }

    static double secFunc(double x) {
      double arg = (x - 4.5) / 17.0;
      double upper_power = Math.pow(Math.atan(arg), 1.0/3.0)
          / 2.0;
      double lower_power = ((2.0/3.0) + Math.pow(x, 1.0/3.0)
          ) / 0.5;
      double inside = Math.pow(Math.asin(arg), lower_power);
      double ans = Math.pow(inside, upper_power);
      return ans;
    }

    static double thirdFunc(double x) {
      double strange_lower_pow = x / 8.0;
      double arg = Math.pow(Math.pow(Math.asin((x - 4.5) /
          17.0), 3.0) / 4.0, strange_lower_pow);
      double denom = Math.asin(0.4*Math.exp(-Math.abs(x)));
      double nom_denom = Math.pow(x/(3.0 - x), 2);
      double nom = 1 - ((0.5 - Math.sin(Math.exp(x)))/4.0)/
          nom_denom;
      double arg_pow = nom / denom;
      double ans = Math.pow((arg), arg_pow);
      return ans;
    }
}
```