Programming assignment 3
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Problems:

1. **Suppose that the tuition for a university is $10,000 this year (year 1) and increases 5% every year. Write a program that computes the tuition in x years from now, with x being a number given by the user. In addition, the program should compute the total cost of y years' worth of tuition starting from now, with y being a number given by the user. Finally, the program should display the tuition for x years along with the total tuition cost at the end of each year. Your program will terminate when the user enters 0.**
2. **Write a program that displays 10 numbers per line, all numbers from 100 to 1000 that are divisible by 5 and 6.**
3. **You can approximate π by using the following series:**

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \frac{1}{13} - \cdots - \frac{1}{2i-1} + \frac{1}{2i+1}\right)$$

   Write a program that displays the π value for i=10000, 20000, …, 100000
4. **A pentagonal number is defined as n(3n-1)/2 for n=1, 2, …, and so on. The first few numbers are 1,5,12, 22, …Write the following function that returns a pentagonal number: int getPentagonalNumber(int n) Write a test program that displays the first 100 pentagonal numbers with 10 numbers on each line.**
5. **Write the following function to return the reverse of an integer number: int reverse(int number) For example, reverse(3456) returns 6543. Write a test program that prompts the user to enter an integer and displays its reversal.**
6. **Write the following function that tests whether or not a point is within a rectangle centered at (0,0): void pointInRectangle(double width, double height, double x, double y, bool &inRectangle) Write a test program that prompts the user to enter the dimensions of a rectangle and the coordinates of a point and displays the appropriate message depending on whether or not the point is within the rectangle. The process is repeated until the user enters 0 for the width and 0 for the height. Your program should do error checking on the width and height.**

Problem 2

```
     MENU
1.University tuition
2.10 numbers per line program
3.PI approximation
4.Pentagonal number
5.Reverse of the integer number
6.Point inside the rectangle
0.To exit the program


2
10 numbers per line

100 102 105 108 110 114 115 120 125 126
130 132 135 138 140 144 145 150 155 156
160 162 165 168 170 174 175 180 185 186
190 192 195 198 200 204 205 210 215 216
220 222 225 228 230 234 235 240 245 246
250 252 255 258 260 264 265 270 275 276
280 282 285 288 290 294 295 300 305 306
310 312 315 318 320 324 325 330 335 336
340 342 345 348 350 354 355 360 365 366
370 372 375 378 380 384 385 390 395 396
400 402 405 408 410 414 415 420 425 426
430 432 435 438 440 444 445 450 455 456
460 462 465 468 470 474 475 480 485 486
490 492 495 498 500 504 505 510 515 516
520 522 525 528 530 534 535 540 545 546
550 552 555 558 560 564 565 570 575 576
580 582 585 588 590 594 595 600 605 606
610 612 615 618 620 624 625 630 635 636
640 642 645 648 650 654 655 660 665 666
670 672 675 678 680 684 685 690 695 696
700 702 705 708 710 714 715 720 725 726
730 732 735 738 740 744 745 750 755 756
760 762 765 768 770 774 775 780 785 786
790 792 795 798 800 804 805 810 815 816
820 822 825 828 830 834 835 840 845 846
850 852 855 858 860 864 865 870 875 876
880 882 885 888 890 894 895 900 905 906
910 912 915 918 920 924 925 930 935 936
940 942 945 948 950 954 955 960 965 966
970 972 975 978 980 984 985 990 995 996
1000
Enter point of menu to continue, 0 to exit the program
```

Program 3

```
          MENU
1.University tuition
2.10 numbers per line program
3.PI approximation
4.Pentagonal number
5.Reverse of the integer number
6.Point inside the rectangle
0.To exit the program


3
Approximation of Pi for 10000 is 3.14169
Approximation of Pi for 20000 is 3.14164
Approximation of Pi for 30000 is 3.14163
Approximation of Pi for 40000 is 3.14162
Approximation of Pi for 50000 is 3.14161
Approximation of Pi for 60000 is 3.14161
Approximation of Pi for 70000 is 3.14161
Approximation of Pi for 80000 is 3.14161
Approximation of Pi for 90000 is 3.1416
Approximation of Pi for 100000 is 3.1416

Enter point of menu to continue, 0 to exit the program
```

Program 4

```
          MENU
1.University tuition
2.10 numbers per line program
3.PI approximation
4.Pentagonal number
5.Reverse of the integer number
6.Point inside the rectangle
0.To exit the program


4
Pentagonal number

1 5 12 22 35 51 70 92 117 145
176 210 247 287 330 376 425 477 532 590
651 715 782 852 925 1001 1080 1162 1247 1335
1426 1520 1617 1717 1820 1926 2035 2147 2262 2380
2501 2625 2752 2882 3015 3151 3290 3432 3577 3725
3876 4030 4187 4347 4510 4676 4845 5017 5192 5370
5551 5735 5922 6112 6305 6501 6700 6902 7107 7315
7526 7740 7957 8177 8400 8626 8855 9087 9322 9560
9801 10045 10292 10542 10795 11051 11310 11572 11837 12105
12376 12650 12927 13207 13490 13776 14065 14357 14652 14950
Enter point of menu to continue, 0 to exit the program
```

Program 5

```
          MENU
1.University tuition
2.10 numbers per line program
3.PI approximation
4.Pentagonal number
5.Reverse of the integer number
6.Point inside the rectangle
0.To exit the program


5
Enter an integer: 345
Reversed Number = 543
Enter point of menu to continue, 0 to exit the program
5
Enter an integer: 4356343
Reversed Number = 3436534
Enter point of menu to continue, 0 to exit the program
```

Program 6

```
          MENU
1.University tuition
2.10 numbers per line program
3.PI approximation
4.Pentagonal number
5.Reverse of the integer number
6.Point inside the rectangle
0.To exit the program


6
Enter width and height of your rectangle:-4
5

Error:wrong value of width or height,try again:5
6
Enter coordinates x and y of your point:-3
4

Your point is outside the rectangle
Enter width and height of your rectangle: 0
0
Program finished
Enter point of menu to continue, 0 to exit the program
```