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/*******************************************************************************
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Program 2: Twenty Four: (a) finds and prints a range, specified by the user, of the
3,185 solutions
to the game TwentyFour and (b) randomly picks one of the solutions to play with the
user.
*******************************************************************************/
#include <iostream>

using namespace std;

// Evaluates using user input of operators
float evaluate(float num1,float num2, char op)
{
switch (op)
{
case '+': return num1 + num2;
case '-': return num1 - num2;
case '*': return num1 * num2;
case '/': return num1 / num2;
default: return 0;
}
}

int main()
{
// Prints out intro to game
cout << "Welcome to the game of Twenty Four." << endl;
cout << "Combine the four numbers shown below," << endl;
cout << "in the order shown below, using the operators" << endl;
cout << "(+, -, *, /) to yield the value 24." << endl;
cout << "**** Begin Debug Display ****" << endl;

// Variable to keep count on number of solutions
int counter = 0;

// Variables to get user input on the beginning and end solution to be printed
int min;
int max;

// Takes in user input for beginning solution
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cout << "Enter the beginning solution to be printed: ";
cin >> min;

// Takes in user input for end solution
cout << "Enter the end solution to be printed: ";
cin >> max;

// Variables used to generate random puzzle
int random = 1 + (rand() % 3185);
float selectedA;
float selectedB;
float selectedC;
float selectedD;
char selectedOp1;
char selectedOp2;
char selectedOp3;

// Calculates and prints solutions
for (float a = 1; a <= 9; ++a)
{
for (float b = 1; b <= 9; ++b)
{
for (float c = 1; c <= 9; ++c)
{
for (float d = 1; d <= 9; ++d)
{
for (int op1 = 0; op1 < 4; op1++)
{
for (int op2 = 0; op2 < 4; op2++)
{
for (int op3 = 0; op3 < 4; op3++)
{
// op1Char: +, -, /, *
char op1Char;
// op2Char: +, -, /, *
char op2Char;
// op3Char: +, -, /, *
char op3Char;

float result;
switch (op1)
{
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case 0:
op1Char = '+';
result = a + b;
break;
case 1:
op1Char = '-';
result = a - b;
break;
case 2:
op1Char = '*';
result = a * b;
break;
case 3:
op1Char = '/';
result = a / b;
break;
}
switch (op2)
{
case 0:
op2Char = '+';
result += c;
break;
case 1:
op2Char = '-';
result -= c;
break;
case 2:
op2Char = '*';
result *= c;
break;
case 3:
op2Char = '/';
result /= c;
break;
}
switch (op3)
{
case 0:
op3Char = '+';
result += d;
break;
```

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case 1:
op3Char = '-';
result -= d;
break;
case 2:
op3Char = '*';
result *= d;
break;
case 3:
op3Char = '/';
result /= d;
break;
}
if (result == 24)
{
counter++;

// Sets the operators & numbers equal to random puzzle operators & numbers
if (random == counter)
{
selectedA = a;
selectedB = b;
selectedC = c;
selectedD = d;

selectedOp1 = op1Char;
selectedOp2 = op2Char;
selectedOp3 = op3Char;
}
// Prints out range selected by user
if (counter >= min && counter <= max)
{
cout << counter << ":" << a << op1Char << b << op2Char << c << op3Char<< d << "=24" <<
endl;
}

}
}
}
}
}
}
```

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}
}

// Prints out random puzzle
cout << "Puzzle chosen is #" << random << ":" << selectedA << selectedOp1 << selectedB
<< selectedOp2 << selectedC << selectedOp3 << selectedD << endl;

cout << "**** End of the Debug Display ****" << endl;

// Gives user the numbers to use from random puzzle
cout << "The numbers to use are " << selectedA << " " << selectedB << " " << selectedC
<< " " << selectedD << endl;

// String declaration for user input on operators
string operators;

// Asks user for operators to use
cout << "Enter the three operators to be used (+, -, *, or /): " << endl;

// Takes in user input on operators
cin >> operators;

// Makes sure user entered 3 operators
if(operators.length() != 3)
{
cout << "invalid number of characters entered, please try again" << endl;
cin >> operators;
}

// Finds an invalid operator
for (char op : operators)
{
if (op != '+' && op != '-' && op != '*' && op != '/')
{
cout << "invalid characters entered, please try again" << endl;
cin >> operators;
}

}

// Evaluate using user entered operators
float temp = evaluate(selectedA, selectedB, operators[0]);
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cout << selectedA << " " << operators[0] << " " << selectedB << " " << " = " << temp
<< endl;
float temp1 = evaluate(temp, selectedC, operators[1]);
cout << temp << " " << operators[1] << " " << selectedC << " " << " = " << temp1 <<
endl;
float temp2 = evaluate(temp1, selectedD, operators[2]);
cout << temp1 << " " << operators[2] << " " << selectedD << " " << " = " << temp2 <<
endl;

// Check if user input operators evaluate to 24
if (temp2 == 24)
{
cout << "Well done!" << endl;
} else
{
cout << "incorrect: The correct answer was:" << endl;
cout << selectedA << selectedOp1 << selectedB << selectedOp2 << selectedC <<
selectedOp3 << selectedD << endl;
}

return 0;
}
```