Sonoma State University Name:

Computer Science Department

CS 460 – Fall 2022 – Watts Score: / 100

Final Exam

(Date due: Friday, 16 December 2022, 11:59 pm – *submissionidF.docx)*

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| 1. | a. The grammar we used for Project 2 is an LL(1) grammar – what does that mean?  b. How does that affect the design and implementation of your Syntactical Analyzer?  c. Why are first and follow sets necessary when creating a Syntactical Analyzer for an LL(1) grammar?  d. What would your Syntactical Analyzer need to do if the grammar were an LL(2) grammar? |
| Answer |  |
| Score  (of 20) |  |

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| 2. | a. What is an Array Mapping Function?  b. What are the benefits of an Array Mapping Function?  The following C++ program uses a struct and a 2-dimensional array to store data.  #include <iostream>  using namespace std;  struct Struct  {  int a;  double b;  char \* c;  };  int main ()  {  Struct Array [5][3];  cout << \*Array[3][1].c << endl;  return 0;  }  c. If the base address of Array is 0x7fffdbe0, what is the address of Array[3][1].c? Explain your calculations. |
| Answer |  |
| Score  (of 20) |  |

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| 3. | a. What is structured programming? What are its benefits?  b. What are the 3 standard categories of control structures? Give a C++, Python, Java, or Scheme example of a structure for each of the 3 categories.  c. How do “break”, “continue”, “return”, and “exit” change the control flow of structures in each of these categories? |
| Answer |  |
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| 4. | Using the rational class implementation provided for Project 3, the output of the following C++ program is  1. (a,b,c) = (7, -14, 17)  2. (p,q,r) = (3/2, -2, -2)  3. (f,g,h) = (-3, -15, -11)  4. (f,g,h) = (-3, 46, 91)  When the input values are: 5 -14  And the output is  1. (a,b,c) = (-12, 5, -39)  Denominator cannot be 0; exiting program.  When the input values are: -14 5  Explain each line of output.  #include <iostream>  #include "rational.h"  using namespace std;  int g = 4;  int change (int x)  {  return g = x \* g;  }  int main ()  {  int a, b;  cin >> a >> b;  int c = 2 \* a++ + 7 / b + ++a;  cout << "1. (a,b,c) = (" << a << ", " << b << ", " << c << ")\n";  rational p (a, b);  rational q = b/a;  int r = rational(2) \* p++ + rational(7) / q + ++p;  cout << "2. (p,q,r) = (" << p << ", " << q << ", " << r << ")\n";  int f = -3;  int h = g++ + change (f);  cout << "3. (f,g,h) = (" << f << ", " << g << ", " << h << ")\n";  f = -3;  h = change (f) + ++g;  cout << "4. (f,g,h) = (" << f << ", " << g << ", " << h << ")\n";  return 0;  } |
| Answer |  |
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| 5. | Using the subset of Scheme defined for our project, define 3 Scheme functions:  **findMaximum** will find and return the maximum numeric value in a list of numeric values. This function should expect a single list as the argument passed to it and should return the minimum value in the list. For example:  (findMaximum ‘(1 3 5 -2 15 -3))  Would return the value 15.  **removeFromList** will remove a specific value from a list. This function should expect to have 2 arguments passed to it; the value to be removed and the list. It should return a copy f the list with the value removed. For example:  (removeFromList 5 ‘(1 3 5 -2 15 -3))  Would return the list (1 3 -2 15 -3). If there are multiple occurrences of the value, it should just remove the first one.  **selectSort** will use the above functions and the selection sort algorithm to sort a list of numerical values into descending order.  The output of the function main:  (define (main)  (display (findMaximum '(-1 -2 5 -3 -4))) (newline)  (display (removeFromList -4 '(-1 2 5 -3 -4 5))) (newline)  (display (selectSort '(1 -1 5 3 -6.2 2.5 -3 4 -1 7 15)))  (newline)  )  Would be:  5  (-1 2 5 -3 5)  (15 7 5 4 3 2.5 1 -1 -1 -3 -6.2)  In addition to pasting the code for your functions below, please submit the 3 functions (findMaximum, removeFromList, and selectSort) in a file called *yourlastname*F.ss. |
| Answer |  |
| Score  (of 20) |  |