Name $\qquad$ C Sci 40
Final Exam
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1. Write a recursive function with one parameter that will return the $n^{\text {th }}$ term of the following series: $2,4,12,48, \ldots$
2. Write a program that will create a linked list of 10 nodes containing the first ten letters of the alphabet. The next field of the last node should be NULL.
```
3. What is wrong with the following programs(one problem each)?
#include <iostream>
using namespace std;
int main()
    {
    int sum, i;
    for(i=1;i<=10;i++)
        sum+=(i*i);
    cout<<"The sum of the first 10 squares is "
        <<sum<<endl;
    return 0;
    }
#include <iostream>
using namespace std;
    int main()
    {
    int i,large, x;
    cout<<"enter a value\n";
    cin>>large;
    for (i=2;i<=10;i++)
        cout<<"enter a value\n";
        cin>>x;
        if (large<x)
            large=x;
    cout<<"The largest value is "<<large<<endl;
    return 0;
    }
```

4. Rewrite the following code using a while loop instead of a for loop. The rewritten code should perform the same function as the original.
sum=0;
for ( $x=3 ; x<=20 ; x+=2$ )
\{
sum+=x;
\}
cout<<sum<<endl;
5. Write a function with one integer parameter that returns the sum of the digits of its parameter.
6. Write a void function that has one array parameter of type double that returns the position of the last nonzero element in the array. Assume the array has MAX elements in it.
7. Write a program for the paper computer that will read two numbers and print the absolute value of their difference. Load it in the computer's memory and set the computer up to execute it.

| 01 | 06 | 11 | 16 | 21 |
| ---: | ---: | ---: | ---: | ---: |
| 02 | 07 | 12 | 17 | 22 |
| 03 | 08 | 13 | 18 | 23 |
| 04 | 09 | 14 | 19 | 24 |
| 05 | 10 | 15 | 20 | 25 |



| Clear \& add | 1 |
| :--- | :--- |
| Add | 2 |
| Subtract | 3 |
| Store | 4 |
| Multiply | 5 |
| Divide | 6 |
| Read | 7 |
| Print | 8 |
| Transfer unconditionally | 9 |
| Transfer on minus | 0 |

8. What is the error in the following Big member function of the bigNumber object? (There is one error.) bigNumber bigNumber::addBig(bigNumber num2)
\{
bigNumber answer;
int i, carry;
for (i = 0; i <= MAX_DIGITS - 1; i++)
\{
answer.num[i] = num[i] + num2.num[i];
\}
for (i = 0; i <= MAX_DIGITS - 1; i++)
\{
ones= answer.num[i] \% 10;
carry=answer.num[i] / 10;
answer.num[i + 1] += carry; answer.num[i] = ones;
\}
return answer; \}
9. Do the following computation in base four. Do not do any conversions to base ten. Show all work.

$$
\begin{array}{r}
312_{\text {four }} \\
\times \quad 23_{\text {four }} \\
\hline
\end{array}
$$

