Midterm 1, PART I.
CS 165, Mathematica.
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Name: _____
Thursday 12 Feb 2004

Closed book. Closed Notes. Please write very legibly.

1. (30 points) Give the output for each of the following inputs. Do not explain.

   (a) In[ ]: 23
   Out[ ]:

   (b) In[ ]: 2 3;
   Out[ ]:

   (c) In[ ]: 1/2
   Out[ ]:

   (d) In[ ]: N[1/2]
   Out[ ]:

   (e) In[ ]: Pi
   Out[ ]:

   (f) In[ ]: x=3
   Out[ ]:

   (g) In[ ]: y:=4
   Out[ ]:

   (h) In[ ]: a=5; b=a+1; c:=a+1; a=10; {a,b,c}
   Out[ ]:

   (i) In[ ]: 2==3
   Out[ ]:

   (j) In[ ]: 2=3
   Out[ ]:

   (k) In[ ]: {a,b,c,d}[[2]]
   Out[ ]:

   (l) In[ ]: lis={{a,b},{c,d},{e,f}}; lis[[2,1]]
   Out[ ]:

   (m) In[ ]: lis={{a,b},{c,d},{e,f}}; lis[[{2,1}]]
   Out[ ]:

   (n) In[ ]: lis={{{c},{d}},{e,f}}; Flatten[lis]
   Out[ ]:

   (o) In[ ]: lis={{a,b},{c,d},{e,f}}; RotateLeft[lis]
   Out[ ]:

2. (20 points) Give the output for each of the following inputs. Just answer without explanation.

   (a) In[ ]: Table[i+j, {i,1,2},{j,i,3}]
   Out[ ]:

(b) In[ ]: Partition[{a,b,c,d,e,f,g},3,2] (*Hint: generates sublists of length 3 with offset 2*)
Out[ ]:

(c) In[ ]: Apply[Plus, Range[1,4]]
Out[ ]:

(d) In[ ]: Map[Reverse,{{{a,b},{1,2,3}},{{c,d},{4,5,6}}}] (* be careful! *)
Out[ ]:

(e) In[ ]: lis={a,b,c,d,e}; Transpose[{Delete[lis, -1], Delete[lis, 1]}]
Out[ ]:

3. (20 points) Describe what each of the following functions does. Explain your reasoning clearly and in detail. Also give the output for each of `f[c,{a,b,c,d}]` and `g[3]`.

(a)
```
f[x_, lis_] := (
      output = "No";
      i := 1;
      While[i <= Length[lis],
        If[x==lis[[i]], output = "Yes"];
        i = i + 1;
      ]; (* end of While *)
      output
      )
```

(b)
```
g[n_] := (
      h[x_] := x^2;
      lis:= Table[Prime[i], {i, 1, n}];
      Apply[Plus, Map[h,lis]]
    )
```

(Recall that `Prime[n]` gives the nth prime number; thus, Prime[1], Prime[2], and Prime[3] are, respectively, 2, 3, and 5.)

PART II: Do **only one** of the following two problems. To get 100%, you need to do the first problem, which is worth 30 points; but if you can't do it, then do the second one for 20 points. Please **circle** the one you're choosing.

1. (30 points) Write a function `g[lis_]` with the following behavior (i.e., it should work like the following examples for lists of arbitrary length):

```
 In[ ]: g[{a, b, c, d, e, f}]
Out[ ]: a b + c + b c + d + c d + e + d e + f

 In[ ]: g[{1, 2, 3, 4, 5}] (* 1x2+3 + 2x3+4 + 3x4+5 = 32 *)
Out[ ]: 32
```

2. (20 points) Write a function `sumProdPairs[lis_]` that outputs the sum of the products of consecutive pairs in an arbitrary list `lis`. Example:

```
 In[ ]: sumProdPairs[{2,5,1,0}] (* 2x5 + 5x1 + 1x0 = 15 *)
Out[ ]: 15
```