CS350
Assignment 1

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Question 1.1

```
declare
fun {Take X N}
   if N =< 0 then nil
   else
      case X of nil then nil
      []H|T then  H|{Take T N-1} end
   end
end

%{Browse {Take [1 2 3] 2}} This is the input Format
```

Question 1.2

```
declare
fun{Last2 X K}
   if K==0 then X
   else {Last2 X.2 K-1}
   end
end
declare
fun{Last X N}
   if {List.length X}=<N then X
   elseif N=<0 then nil
   else {Last2 X {List.length X}-N}
   end
end

%{Browse {Last [1 2 3] 4}} Input type
```

Question 1.3

```
declare
fun {Merge X Y}
   if X==nil then if Y==nil then nil else Y.1|{Merge X Y.2} end
   elseif Y==nil then if X==nil then nil else X.1|{Merge X.2 Y}end
   else
      if X.1> Y.1 then Y.1|{Merge X Y.2}
      else X.1|{Merge X.2 Y} end
   end
end

%{Browse {Merge [1 2 3] [2 4 5]}} This is the input Format
```

Question 2.1

```
declare fun {Sum X Y} X+Y end
declare fun {Product X Y} X*Y end
declare
fun {ZipWith BinOp X Y }
   if X == nil then nil
   elseif Y == nil then nil
   else {BinOp X.1 Y.1}|{ZipWith BinOp X.2 Y.2 } end
end

%{Browse {ZipWith  Sum [1 2  5 3] [2 4 4 5]}} This is the input Format
```

Question 2.2

```
declare fun{Sum X Y} X+Y end
declare
fun {FoldR X BinOp Z}
   case X of nil then Z
   [] H|T then {BinOp {Pow H 2} {FoldR T BinOp Z}}
   end
end

%{Browse {FoldR [1 2 3] Sum 0}} This is the input Format
```

Question 2.3

```
declare fun {Sum X Y} X+Y end
declare
fun {FoldL X BinOp Y}
   case X of nil then Y
   [] H|T then {FoldL T BinOp {BinOp Y H}}
   end
end

%{Browse {FoldL [1 2 3] Sum 0}}  This is the input Format
```

Question 3.1

```
declare
fun lazy {Series X F P T S}
   if (T mod 2) ==0
        then {Series X F*T P T+1 S}
   elseif S<0
        then ~1*({IntToFloat {Pow X P}}/{IntToFloat F*T})|{Series X F*T P+2 T+1 1}
   else
        {IntToFloat {Pow X P}}/{IntToFloat F*T} | {Series X F*T P+2 T+1 ~1}
   end
end
declare
fun {Sin X}
   {Series X 1 1 1 1}
end

%{Borwse {Sin X}} Enter the value of X
% X in function Serie corrosponds to Sin(x)
% F corrosponds to the Factorial value
```

```
% P corosponds to the Power
% T corrosponds to the Term
% S corrosponds to the Sign
```

Question 3.2

Question 4

```
declare
fun{Check X I K}
   if X==nil then true
   elseif K==I then {Check X.2 I K+1}
   elseif X.1==0 then {Check X.2 I K+1}
   else false
   end
end
declare
fun{IsDiagonal X}
   local Diagonal in
      fun{Diagonal X I}
         if X==nil then true
         elseif {Check X.1 I 1} then {Diagonal X.2 I+1}
         else false
         end
      end
      {Diagonal X 1}
   end
end

%{Browse {IsDiagonal X }} Input Type
```