Quiz 2: CSE307/CSE526 – Principles of Programming Languages

Name: _____ ID No: _____ (Total points: 20)

1. Given the following function definitions: (1 pt)

```
fun double x = 2 * x;
fun triple x = 3 * x;
```

What is the result of `double(triple(size "seven"));`

a) `tychon mismatch`
b) `"fourty two"`
c) `30 : int`
d) `25 : int`

2. The function sndhalf takes a string and returns the second half of it. We do not care what happens for a string of odd length. Select the correct function definition: (1 pt)

a) `fun sndhalf s = substring(s, size div 2,size div 2);`
b) `fun sndhalf s = substring(s, size s / 2, size s / 2);`
c) `fun sndhalf s = substring(s, size s div 2, size s div 2);`
d) `fun sndhalf s = substring(s, size s div 2 + 1, size s);`

3. Given the following function definition:

```
fun f s = substring(s,1,size s - 1) ^ substring(s,0,1);
```

The result of the call `f(f("elbow"))` is: (1 pt)

a) `=`
b) `f(substring("elbow",1, 4) ^ substring("elbow",0,1))`
c) `"bowel"`
d) `"elbow"`

4. Given the following function definition: (1 pt)

```
fun double x = 2 * x;
fun triple x = 3.0 * x;
```

What is the result of `double(triple(3.0));`

a) `18.0`
b) `18`
c) `Error: operator and operand do not agree`
d) `double(9)`

5. Select the expression which will evaluate to [1,2,3,4]: (1 pt)

a) `1::[2,3]@[4]`
b) `[1]::[2,3]@[4]`
c) `explode "1234"`
d) `[1,2,3]::4`

6. Given the following recursive function definition select the value of f(2,5): (1 pt)

```
fun f(a, 0) = 1
  | f(a, n) = a * f(a, n-1);
```

a) `0 : int`
b) `10 : int`
c) `32 : int`
d) `25 : int`

7. Select the recursive function which defines the sequence 5, 8, 11, 14, 17, 20 .. when executed on inputs 0,1,2,3,4,5… (1 pt)

a)
```
fun s(0) = 5
  |  s(n) = n + 3;
```

b)
```
fun s(0) = 5
  |  s(n) = 3*n + 5
```

c)
```
fun s(n) = 3 * n + 5;
```

d)
```
fun s(0) = 5
  |  s(n) = 3 + s(n-1)
```

8. Select the recursive function which defines the sequence "and his dog", "1 man and his dog""2 man 1 man and his dog", "3 man 2 man 1 man and his dog",… (1 pt)

a)
```
fun medow(0) = "and his dog went to mow a medow."
  |  medow(n) = Int.toString n ^
  (if n>1 then " men " else " man ") ^ medow(n-1);
```

b)
```
fun medow(0) = "and his dog"
  |  medow(n) = n ^ " man " ^ medow(n-1);
```

c)
```
fun medow(0) = "and his dog"
  |  medow(n) = Int.toString n ^ " man " ^ medow(n-1);
```

d)
```
fun medow(0) = " and his dog"
  |  medow(n) = makestring n ^ " man" ^ medow(n-1);
```

9. Give the type of the following function: (1 pt)

```
fun g x a b = 2*a + 3*b;
```

a) 'a -> int -> int -> int
b) int -> int -> int
c) ('a * int * int) -> int
d) int -> int -> int -> int

10. Give the type of the following function: (1 pt)

```
fun g(x,a,b) = 2*a + 3*b;
```

a) 'a -> int -> int -> int
b) int -> int -> int
c) 'a * int * int -> int
d) ('a * int * int) -> int

11. Given the following tuple, what is the output of `#1(#2(tuple));`? (1 pt)

```
val tuple = (4,(5.0,6),"abcd",("e","f"));
```

a) (5.0, 6)
b) "a"
c) 5.0
d) "abcd"

12. Given a record `{make="Toyota", model="Corolla", year=2017, color="silver"}`, which of the following function definition correctly prints "`ToyotaCorolla`"? (select all that apply): (1 pt)

a) `fun full_name{color:string, make:string, model:string, year:int}:string = make ^ model;`
b) `fun full_name{make:string, model:string}:string = make ^ model;`
c) `fun full_name{color:string, make:string, model:string, year:int} = make ^ model;`
d) `fun full_name{color, make, model, year} = make ^ model;`

13. Define the following function: (2 pts)

`timeslist 4 [4, 2, 5, 1] = [16, 8, 20, 4]`

```
fun timeslist x nil    = nil
|   timeslist x(h::t) = (x*h : int)::timeslist x t;
```

14. Define the following function: (2 pts)

`count_1s [4,3,1,6,1,1,2,1] = 4`

```
fun count_1s nil     = 0
|   count_1s (1::t) = 1 + count_1s t
|   count_1s (h::t) = count_1s t;
```

15. Given a function map as follows determine the output of expressions given below: (4 pts)

```
Fun map f nil = nil (* pre-defined anyhow *)
| map f (h::t) = (f h)::map f t;
```

a) `map(fn s => s^"io") ["pat", "stud", "rat"];`

["patio","studio","ratio"]____

b) `map(fn i => [i]) [4, 2, 1];`

_[[4],[2],[1]]

c) `map hd [[2, 3], [7, 3, 2], [8, 6, 7]];`

[2,7,8]_____

d) `map(hd o explode)["final","omega","previous","persist"];`

__ [#"f",#"o",#"p",#"p"]_____