

6. What is the evaluation result of the following expression?

```
let a = 2. in
  function x -> function y ->
    let b = 5. in (x*.a) > (b +. float_of_int y) || (x=0.);;
```

- (a) - : int -> float -> bool = <fun>
- X (b) - : float -> int -> bool = <fun>
- (c) - : float -> float -> int -> bool = <fun>
- (d) - : float -> int = <fun>
- (e) An error.

7. What is the evaluation result of the following definition?

```
let f x y = match (x, y) with
  (0, _) -> true
  | (_, "y") -> false
  | _ -> failwith "what?" ;;
```

- (a) val f : int \* string -> bool = <fun>
- (b) val f : int -> string -> int \* string -> bool = <fun>
- X (c) val f : int -> string -> bool = <fun>
- (d) val f : int -> 'a -> bool = <fun>
- (e) An error.

8. What is the type of the function f defined below?

```
let f = function
  (_,0) -> 0
  | (x,y) when x=y -> 1
  | _ -> -1 ;;
```

- (a) int -> int -> int
- X (b) int \* int -> int
- (c) 'a \* 'b -> int
- (d) 'a -> 'a -> int
- (e) The function is incorrect.

9. What is the type of the function g defined below?

```
let g = function
  ((0,_),_) | (_,(0,_)) -> (0, false)
  | ((x,sx),(y,sy)) when sx=sy -> (x*y, false)
  | ((x,true),(y,sy)) -> (x*y, not sy)
  | ((x,_),(y,sy)) -> (x*y, sy) ;;
```

- (a) int \* int -> int \* bool
- X (b) (int \* bool) \* (int \* bool) -> int \* bool
- (c) (int \* bool) -> (int \* bool) -> int \* bool
- (d) (int \* bool) \* (int \* bool) \* (int \* bool)
- (e) The function is incorrect.

10. What is the evaluation result of the following phrase (g the above function)?

```
g ((5,true),(4,false)) ;;
```

- (a) - : int \* int \* bool = (5, 4, true)
- (b) - : (int \* int) \* bool = ((5, 4), true)
- (c) - : int \* bool = (20, false)
- X (d) - : int \* bool = (20, true)
- (e) No result, the function is still wrong!

# MCQ 4

Tuesday, 12 September

## Question 11

In  $\mathbb{R}$ , consider the subsets  $A = [0, 6[$  and  $B = \{n \in \mathbb{N}, n \leq 10\}$ . Then:

- a.  $A$  has a finite cardinal number.
- ✗ b.  $B$  has a finite cardinal number.
- c.  $\text{Card}(A \cap B) = 5$
- ✗ d.  $\text{Card}(A \cap B) = 6$
- e. None of the others

## Question 12

Let  $E = \{0, 1, 2\}$  and  $\mathcal{P}(E)$  the set of all the subsets of  $E$ . Then:

- ✗ a.  $\{0, 1\} \in \mathcal{P}(E)$
- b.  $(0, 1) \in \mathcal{P}(E)$
- ✗ c.  $E \in \mathcal{P}(E)$
- d.  $E \subset \mathcal{P}(E)$
- e. None of the others

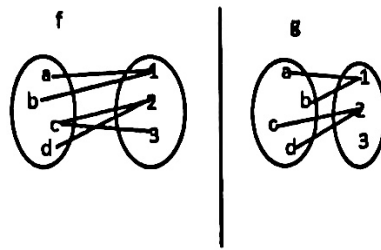
## Question 13

Let  $A = \{a, b, c, d, e\}$  and  $B = \{b, e, f, g\}$ .

- a.  $\text{Card}(A \cup B) = 9$
- b.  $\text{Card}(A \cup B) = 8$
- ✗ c.  $\text{Card}(A \cup B) = 7$
- d. None of the others

### Question 14

Consider the two following figures:



- a. Figure  $f$  represents a function from  $\{a, b, c, d\}$  to  $\{1, 2, 3\}$ .
- < b. Figure  $f$  does not represent a function from  $\{a, b, c, d\}$  to  $\{1, 2, 3\}$ .
- × c. Figure  $g$  represents a function from  $\{a, b, c, d\}$  to  $\{1, 2, 3\}$ .
- d. Figure  $g$  does not represent a function from  $\{a, b, c, d\}$  to  $\{1, 2, 3\}$ .

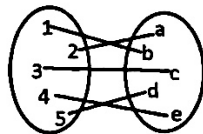
### Question 15

Let  $E$   $F$  two sets and  $f : E \rightarrow F$ . The function  $f$  is injective if and only if:

- a.  $\forall (x, x') \in E^2, x = x' \implies f(x) = f(x')$
- × b.  $\forall (x, x') \in E^2, x \neq x' \implies f(x) \neq f(x')$
- c.  $\forall (x, x') \in E^2, x = x'$  and  $f(x) \neq f(x')$
- d.  $\forall (x, x') \in E^2, x \neq x'$  and  $f(x) = f(x')$
- e. None of the others

### Question 16

Consider the function  $f : \{1, 2, 3, 4, 5\} \rightarrow \{a, b, c, d, e\}$  defined by the following figure:



- a.  $f$  is injective, not surjective.
- b.  $f$  is surjective, not injective.
- c.  $f$  is neither injective nor surjective.
- × d.  $f$  is injective and surjective.

### Question 17

Let  $I$  and  $J$  be two intervals of  $\mathbb{R}$  and  $f : \begin{cases} I & \rightarrow J \\ x & \mapsto |x| \end{cases}$

- a. If  $I = J = \mathbb{R}$ , then  $f$  is bijective.
- b. If  $I = [0, +\infty[$  and  $J = \mathbb{R}$ , then  $f$  is bijective.
- c. If  $I = \mathbb{R}$  and  $J = [0, +\infty[$  then  $f$  is bijective.
- ✗ d. If  $I = J = [0, 5]$  then  $f$  is bijective.
- e. None of the others

### Question 18

Consider the real functions  $f$  and  $g$  defined for all  $x \in \mathbb{R}$  by:  $f(x) = e^{2x}$  and  $g(x) = 3 \cos(x)$ . The function  $g \circ f$  is defined for all  $x \in \mathbb{R}$  by:

- a.  $g \circ f(x) = e^{3 \cos(x)}$
- ✗ b.  $g \circ f(x) = 3 \cos(e^{2x})$
- c. none of these formulas

### Question 19

Consider the set  $E = \{0, 1, 2, 3\}$ . Select the correct answer(s):

- a.  $1 \subset E$
- ✗ b.  $3 \in E$
- c.  $E \in E$
- d.  $\{0, 2\} \in E$
- e. None of the others

### Question 20

Select the correct answer(s)

- a.  $\{x \in \mathbb{N}, -1 < x \leq 3\} = ]-1, 3]$
- ✗ b.  $\{x \in \mathbb{N}, 0 < x < 4\} = \{1, 2, 3\}$
- c.  $\{x \in \mathbb{R}, x^2 \leq 4\} = [0, 2]$
- d.  $\{x \in \mathbb{R}, x^2 \leq 4\} = ]-\infty, 2]$
- e. None of the others

CAML  
MCQ #4  
Tuesday, September the 12<sup>th</sup> 2023

1. What does the evaluation result of the following phrase contain?

```
let g x y = match x with
  0 -> 0
  | y -> 1
  | x -> -1 ;;
```

- X (a) `val g : int -> 'a -> int = <fun>`
- (b) `val g : int -> int -> int = <fun>`
- X (c) ... Warning ...: this match case is unused.
- (d) ... Warning ...: this pattern-matching is not exhaustive.

2. What does the evaluation result of the following phrase contain?

```
let g n = match n mod 10 with
  | 0 | 2 | 4 | 6 | 8 -> true
  | 1 | 3 | 5 | 7 | 9 -> false
  | _ -> failwith "problem";;
```

- X (a) `val g : int -> bool = <fun>`
- (b) `val g : int -> int = <fun>`
- (c) ... Warning ...: this match case is unused.
- (d) ... Warning ...: this pattern-matching is not exhaustive...
- (e) Another "Warning".

3. What is the evaluation result of the following phrase?

```
let (a, b) = (1, true) ;;
```

- (a) `val (a, b) : int * bool = (1, true)`
- (b) `(val a : int, val b : bool) = (1, true)`
- X (c) `val a : int = 1`  
`val b : bool = true`
- (d) An error.

4. What will be the last result after successive evaluations of the following phrases?

```
let a = let b = (1, true) in (b, "one") ;;
let (x, y) = a in x ;;
```

- X (a) `- : int * bool = (1, true)`
- (b) `- : int * string = (1, "one")`
- (c) `(int * bool) * string = ((1, true), "one")`
- (d) `bool * string = (true, "one")`
- (e) An error.

5. What will be the last result after successive evaluations of the following phrases?

```
let a = 2 ;;
let f x = a*x ;;
f 2 * (function x -> x+1) (2*5) ;;
```

- X (a) `val f : int -> int = <fun>`
- (b) `- : int = 44`
- (c) `- : int = 22`
- (d) `- : int = <fun>`
- (e) An error.