CAML
MCQ #1
Thursday, September the 7th 2023

Remarks (valid for all MCQs) :

- This is an MCQMA, that is to say a Multiple Choice Question and Multiple Answer test, which means that, there may be several right answers.
- CAML :
  - All questions are about the interpreted mode of CAML as studied in class.
  - Unless otherwise stated, the environment is assumed to be empty for each question.

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1. **What is the evaluation result of the following phrase?**

```
1234 mod 100 * 1000;;
```

(a) `- : int = 4000`
(b) `- : int = 3000`
(c) `- : int = 23000`
(d) `- : int = 34000`
(e) An error.

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2. **What is the evaluation result of the following phrase?**

```
let toto = 3 * 10 + 12 ;;
```

(a) `let toto = 3 * 10 + 12`
(b) `- : int = 42`
(c) `val toto : int = 42`
(d) `val toto = 42 : int`
(e) An error.

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

```
3 + 4 and 8 * 2;;
```

(a) `- : int = 7`
`- : int = 16`
(b) `- : int = 23`
(c) `- : int = 112`
(d) `- : int = 23`
`- : int = 112`
(e) An error.

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4. **What is the evaluation result of the following phrase?**

```
let x = 3 in
  let y = 4 in
    2 * x+3 * y ;;
```

(a) `- : int = 18`
(b) `val x : int = 18`
(c) `- : int = 48`
(d) `val x : int = 48`
(e) An error.

5. **What is the evaluation result of the following phrase?**

```
let a =
    let b = 5 in
        b * (b-1)
  + let b = 4 in
        b * (b-1) ;;
```

(a) *32*
(b) `val a : int = 32`
(c) `- : int = 32`
(d) An error.

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6. **Among the following phrases, which are improper?**

(a) `3 * 1.5 ;;`
(b) `let a = 1. and b = 3. in (a +. 2.) <= (4. -. b) ;;`
(c) `let a = 1. and b = 3 in (a +. 2.) <= (4 - b) ;;`
(d) `(4 < 8) || ("a" = "b") ;;`
(e) None of the above.

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7. **Let `f`, `g`, `x` and `y`, all be defined in the current environment. Among the following expressions, which are equivalent to `f x + g y`?**

(a) f (x) + g (y)
(b) (f x) + (g y)
(c) f (x + g y)
(d) ((f x + g) y)
(e) (f x + (g y))

---

8. **What is the evaluation result of the following definition?**

```
let f2 x = x mod 2 = 0 ;;
```

(a) `val f2 : bool -> bool = <fun>`
(b) `val f2 : int -> bool = <fun>`
(c) `val f2 : bool -> int = <fun>`
(d) `val f2 : int -> int = <fun>`
(e) An error.

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9. **Let `f2` be the function defined in the previous question. What does the function `f3` defined below and applied to the integer x do?**

```
let f3 x = f2 (x+1) ;;
```

(a) `f3`(x) computes the division remainder of $x+1$ by 2.
(b) `f3`(x) determines if x is even.
(c) `f3`(x) determines if x is odd.
(d) `f3`(x) determines if $x+1$ is odd.
(e) `f3`(x) does not compute anything, there is an error.

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10. **In the expression `x >= y`, `x` and `y` have to be:**

(a) Of the same type
(b) Of different types
(c) Imperatively integers
(d) Imperatively of numerical types (`int` or `float`)

MCQ 1

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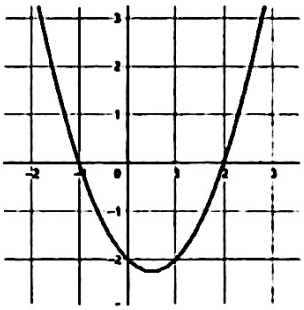
Question 11

Below is the graph of a polynomial function of degree 2, that is, a function of the form $P(x) = ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$.



From this graph, we can deduce that:

a. The discriminant of P is strictly positive.

b. The discriminant of P is zero.

c. The discriminant of P is strictly negative.

d. The graph of P does not enable one to know the sign of its discriminant.

Question 12

Consider the function f defined for all $x \in \mathbf{R}$ by $f(x) = 2x^2 + 4x$. Then

a. f vanishes at $x = 2$.

b. The function f is positive on $\mathbf{R}$.

c. The function f is strictly negative on $]-2, 0[$.

d. The function f is strictly positive on $]-2, 0[$.

e. None of the others

Question 13

Select the correct answer(s)

a. $e^5 = e^2 + e^3$

b. $e^5 = e^2 \times e^3$

c. $e^0 = 0$

d. $e^0 = 1$

e. None of the others

Question 14

Select the correct answer(s)

- a. $\ln(6) = \ln(2) + \ln(3)$
- b. $\ln(6) = \ln(2) \times \ln(3)$
- c. $\lim\limits_{x \to 0^+} \ln(x) = 0$
- d. $\ln(0) = 1$
- e. None of the others

Question 15

The solution set of the inequality $\ln(x) < 0$ is $S =]-\infty, 1[$.

- a. True
- b. False

Question 16

We roll a dice whose 6 sides are numbered 1 to 6. Consider the properties

P : "We get an even number" and Q : "We get a number strictly greater than 3"

- a. The negation of Q is: "We get a number strictly smaller than 3"
- b. $P \wedge Q$ is: "We get number 6"
- c. $P \vee Q$ is: "We get one of the numbers 2, 4 or 6"
- d. The negation of $P \wedge Q$ is: "We get one of the numbers 1, 2, 3 or 5"
- e. None of the others

Question 17

Let x be a real number.

- a. The sense of "$-1 < x \leqslant 2$" is: "$(x > -1) \vee (x \leqslant 2)$"
- b. The sense of "$-1 < x \leqslant 2$" is: "$(x > -1) \wedge (x \leqslant 2)$"
- c. The negation of "$-1 < x \leqslant 2$" is: "$-1 \geqslant x > 2$"
- d. None of the others

Question 18

Let x be a real number. Select the correct answer(s)

a. $x > 1 \implies x \geqslant 1$

b. $x \geqslant 1 \implies x > 1$

c. $e^x = 2 \implies x = \ln(2)$

d. $x = \ln(2) \implies e^x = 2$

e. None of the others

Question 19

The negation of "All the tulips are red" is:

a. "No tulip is red"

b. "Some tulips are not red"

c. "There exist blue tulips"

d. None of the others

Question 20

Let $n \in \mathbb{N}$. The negation of $"n^2 \geqslant 4 \implies n \geqslant 2"$ is:

a. $"n^2 < 4 \implies n < 2"$

b. $"n \geqslant 2 \implies n^2 \geqslant 4"$

c. $"n^2 \geqslant 4 \implies n < 2"$

d. $"(n^2 < 4) \wedge (n < 2)"$

e. None of the others