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# Exámenes

# Self-Assessment Test Theme 2

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Parte 1 de 3 - Second 0.67/ 2.0 Puntos

Preguntas 1 de 10

1.0/ 1.0 Puntos. Puntos descontados por fallo: 0.33

Which of the following statements is TRUE?

- A. The static semantics analyzes the most stable part of the code.
- B. Errors due to type incompatibilities are detected during the semantic analysis.
- C. Syntactic errors in programs are detected during the linking phase.
- D.
  The static semantics detects all errors in compilation time; hence the dynamic semantics is executed with no error.

Preguntas 2 de 10

-0.33/ 1.0 Puntos. Puntos descontados por fallo: 0.33

The following BNF rules define a grammar G:

```
<decl>::= <tipo> <ident> {,<ident>}

<tipo>::= int|float|char

<ident> = <letra> <letra>*

<letra> = a | .. | z | A | .. | Z
```

Which of the following sentences is legal in the language defined by G?

- A. `int a = 1`
- B. `float esta, y, aquella`
- C. `char a1, a2, a3`
- D. `double esta = 1.5`

Parte 2 de 3 - First 2.67/ 3.5 Puntos

Preguntas 3 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Which configuration is required (in *) to make the following evaluation complete by using the small-step operational semantics?

⟨if X>Y then Y:=Y+X else Y:=0, {X ↦→ 42, Y ↦ 0}⟩
⟨X>Y, {X ↦ 42, Y ↦ 0}⟩ ⇒ true
⟨X, {X ↦ 42, Y ↦ 0}⟩ ⇒ 42
⟨Y, {X ↦ 42, Y ↦ 0}⟩ ⇒ 0
→ ⟨Y:=Y+X, {X ↦ 42, Y ↦ 0}⟩
⟨Y+X, {X ↦ 42, Y ↦ 0}⟩ ⇒ 42
⟨Y, {X ↦ 42, Y ↦ 0}⟩ ⇒ 0
⟨X, {X ↦ 42, Y ↦ 0}⟩ ⇒ 42
→ (*

- A. ⟨ Y:=0, {X ↦ 42, Y ↦ 0} ⟩
- B. ⟨ skip, {X↦ 42, Y ↦ 0} ⟩
- C. ⟨ if X>Y then Y:=Y+X else Y:=0, {X ↦ 42, Y ↦ 0} ⟩
- D. ⟨ skip, {X ↦ 42, Y ↦ 42} ⟩

Preguntas 4 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Given the axiomatic definition of the conditional instruction

pmd(if B then i1 else i2, Q) = (B ^ pmd(i1, Q)) v (not(B) ^ pmd(i2, Q))

and {Q}={y=4}, which is the weakest precondition for the following program?:

if x>=0
then y:=x
else y:=-x

- A. (x = 4) ∨ (x = -4)
- B. (x = 4) ∧ (x = -4)
- C. x = 4
- D. x = -4

Preguntas 5 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Consider the following program *S*:

```
x := 0;
y := -1;
if x > 0 then y := 1 else x := 0;
```

and the specification given by the precondition P= *true* and postcondition Q = (y > 0). Which of the following claims is **TRUE**?

- A. No initial state satisfies the precondition P.
- B.
  The program does **NOT** satisfy the specification, that is, there is an initial state that satisfies the precondition but the final state which is obtained after executing the program does not satisfy the postcondition.
- C. Starting from any initial state, the postcondition Q will always be true on the obtained final state.
- D. The final values of variables x and y depend on their values in the initial state.

Preguntas 6 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Which of the following statements concerning the semantics of programming languages is false?

- A. Semantics is a key tool to make comparisons between different programs.
- B. The semantics description of a program is unnecessary if the language syntax is defined formally.
- C. The operational semantics of a language is part of its dynamic semantics.
- D.
  The semantics of a programming language is the basis to develop advanced tools of program development in that language.

Preguntas 7 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Given the following axiomatic definition of the assignment operation and the if-then-else operation

wp(X := exp, Q) = Q[X ↦ exp]
wp(if B then i1 else i2, Q) = (B ^ wp(i1, Q)) v (not(B) ^ wp(i2, Q))

which of the following expressions is the weakest precondition P of the following program with respect to the postcondition Q:

{P}={?}
if x=0
  then y:= 2*x
  else y:= x+y
{Q}={x=0}

- A. P = (x = 0)
- B. P = (y = 0)
- C. P = (x = 0 ∧ y=0)
- D. P = (x = 0 ∧ y=0) v (x ≠ 0 ∧ y≠0)

Preguntas 8 de 10

-0.33/ 0.5 Puntos. Puntos descontados por fallo: 0.33

According to the following rules, what does the 3-ary operator *a0 = b = a1* do, where *a0* and *a1* are arithmetic expressions, and *b* a boolean expression?

$$\frac{\langle b,e\rangle \Rightarrow true \quad \langle a0,e\rangle \Rightarrow n0}{\langle a0 = b = a1,e\rangle \Rightarrow n0} \qquad \frac{\langle b,e\rangle \Rightarrow false \quad \langle a1,e\rangle \Rightarrow n1}{\langle a0 = b = a1,e\rangle \Rightarrow n1}$$

- A. It returns *true* if condition *b* holds, and *false* otherwise.
- B. Command *a0* is executed if *b* is true, and *a1 is executed otherwise*.
- C. It returns the addition of the arithmetic expressions *a0* and *a1*.
- D. It returns the value of *a0* if *b* holds, and the value of *a1 otherwise*.

Preguntas 9 de 10

0.5/ 0.5 Puntos. Puntos descontados por fallo: 0.33

Given the following fragment of a program, in which the assertion Q is a predicate that stands for the postcondition:

x := z
{Q} = {x = X}

according to the axiomatic semantics, point out which of the following options corresponds to the weakest precondition of the instruction in this program and Q, ie

- A. x = X
- B. z = Z
- C. z = X
- D. x = z

Parte 3 de 3 - Third 1.0/ 1.0 Puntos

Preguntas 10 de 10

1.0/ 1.0 Puntos. Puntos descontados por fallo: 0.33

Given a program $P$ and a program-specification $P_E$, which of the following claims is **WRONG**?

- A. The semantics of $P$ and $P_E$ is helpful to verify whether $P$ is a correct (and complete) implementation of $P_E$.
- B.
  If the semantics of $P$ and $P_E$ coincide, then we can say that $P$ is a correct and complete implementation of the specification $P_E$.
- C. If the semantics of $P$ and $P_E$ coincide, this means that $P$ and $P_E$ are syntactically equal.
- D. Two syntactically different programs $P$ and $P_E$ may have the same semantics.