Midterm test - quiz

Due Apr 16, 2021 at 5:02pm   **Points** 30   **Questions** 15
Available until Apr 16, 2021 at 5:02pm   **Time Limit** 40 Minutes

This quiz is no longer available as the course has been concluded.

Attempt History

	Attempt	Time	Score
LATEST	[Attempt 1](#)	26 minutes	30 out of 30

⚠ Correct answers are hidden.

Score for this quiz: **30** out of 30
Submitted Apr 16, 2021 at 4:58pm
This attempt took 26 minutes.

Question 1   **2 / 2 pts**

A=[1..4] is the base-statespace of program *S*.

$$S = \{ \begin{array}{l} 1 \to < 1, 2 >, 1 \to < 1, 4, 2, 3 >, 1 \to < 1, 4 > \\ 2 \to < 2, fail >, 2 \to < 2 > \\ 3 \to < 3, 1 >, 3 \to < 3, 2 >, 3 \to < 3 >, 3 \to < 3, 4 >, \\ 4 \to < 4 >, 4 \to < 4, 4, ... > \end{array} \}$$

Select all the true statements!

☐ $(4,4) \in p(S)$

☐ $(2,2) \in p(S)$

☑ $(1,4) \in p(S)$

☐ None of the other statements is true.

☑ $2 \in p(S)(1)$

Question 2	2 / 2 pts

A=[1..4] is the base-statespace of program S.
We do not know the program S, but we know that p(S)={ (1,1), (3,1) }.

F={ (3,2), (3,1), (1,w) } is a problem over A, where $w \in$ A.

Which state of A would you choose as w in order to satisfy the following condition:

- program S solves problem F

○ w can be either 1 or 3, but it cannot be 2 or 4

○ w can be any state of A

○ there is no state in A that makes the given condition true

◉ w can be nothing else but 1

Question 3	2 / 2 pts

H = [1..10]
A = (x:H)

Let S denote the loop over the statespace A, where the program $x := x-3$ is the body of the loop, and the logical function $x>3$ is the loop condition.

Select all the true statements!

☑ State {x:2} is in the domain of relation p(S).

☐ None of the other statements is true.

☑

Starting its execution from the state {x:10}, program S terminates faultlessly.

☑ The pair ({x:7},{x:1}) is in set p(S).

☑ State {x:2} is in set p(S)({x:8}).

Question 4

2 / 2 pts

A=[1..4] is the base-statespace of program S.

$$S = \{ \begin{array}{c} 1 \to <1,2>, 1 \to <1,4,2,3>, 1 \to <1,4> \\ 2 \to <2, fail>, 2 \to <2> \\ 3 \to <3,1>, 3 \to <3,2>, 3 \to <3>, 3 \to <3,4>, \\ 4 \to <4>, 4 \to <4,4,...> \end{array} \}$$

Select all the true statements!

☐ (2,2) ∈ p(S)

☑ (3,3) ∈ p(S)

☑ 4 ∉ p(S)

☑ 1 ∈ p(S)(3)

☐ None of the other conditions is true.

Question 5

2 / 2 pts

H = [1..10]
A = (x:H)

Let S denote the program $x:= x-3$ over the base-statespace A.

How many elements does the set $D_{p(S)}$ have?

○ 0

○ 6

○ infinite number of elements

◉ 7

○ 8

Question 6
2 / 2 pts

H = [1..10]
A = (x:H)

Let S denote the loop over the statespace A, where the program $x := x-3$ is the body of the loop, and the logical function $x>3$ is the loop condition.

How many elements does the set $D_{p(S)}$ have?

○ 7

◉ 10

○ 0

○ 8

Question 7
2 / 2 pts

How many of the following sequences can be in the range of a program over the base-statespace A=[1..4]?

<1,1,1,1, ...>

<3, fail>

<4, (4, false), 1>

3

Question 8

2 / 2 pts

H = [1..10]
A = (x:H)

Let S denote the loop over the statespace A, where the program $x := x-3$ is the body of the loop, and the logical function $x>3$ is the loop condition.

How many executions program S have, that end in the state *fail* ?

- ● 0
- ○ 2
- ○ 3
- ○ 10

Question 9

2 / 2 pts

A=[1..4] is the base-statespace of program S.
We do not know the program S, but we know that p(S)={ (3,2), (3,1) }.

F={ (3,2), (3,1), (1,w) } is a problem over A, where $w \in$ A=[1..4].

Which state of A would you choose as w in order to satisfy the following condition:

- program S solves problem F

- ● there is no state in A that makes the given condition true
- ○ w can be any state of A
- ○ the given information is not sufficient to answer the question
- ○ w can be nothing else but 1

Question 10

2 / 2 pts

$A = (x:\mathbb{N}^+, y:\mathbb{N}^+)$

Given a problem F in the following way:

$F = \{ (a,b) \in A \times A \mid 3 \cdot x(a) + 2 \cdot y(b) < 10 \}$

How many elements does problem F have?

- ○ 6

- ○ 3

- ◉ 4

- ○ 5

Question 11

2 / 2 pts

$A = (x:\mathbb{N}, y:[1..100])$

Consider the following problem over statespace A:

$F = \{ (a,b) \in A \times A \mid x(a)=x(b) \ \wedge \ 2 \cdot y(b) < x(a) \}$

Is the pair ({x:8, y:10}, {x:8, y:3}) in the problem F?

- ◉ True

- ○ False

Question 12

2 / 2 pts

$A = (x:N, y:N, z:N)$
$B = (x':N, y':N)$

Q = (x=x' ∧ y=y')

R= (Q ∧ x < z ∧ z < y ∧ prime(z))

prime(z) is true if z is a prime number.

Consider the specification given above.

How many elements does the truth set of R{ x':20, y':25 } have?

○ infinite number of elements

○ 3

○ 0

◉ 1

Question 13

2 / 2 pts

A = {1,2} is the base-statespace of program S.

S = { 1 -> <1,2>, 2 -> <2,2,2,...> }

Given two problems F1 and F2:

F1 = { (1,1) }

F2 = {}

Which problem does the program S solve?

○ S solves both F1 and F2.

○ S solves F1, but does not solve F2.

○ S does not solve F1, and S does not solve F2.

◉ S solves F2, but does not solve F1.

Question 14

2 / 2 pts

A = (x:[1..10])

How many elements are there in the truth set of the following function?
wp(x:=x-3, x<5)

4

Question 15   2 / 2 pts

A = (x:$\mathbb{N}$, y:[1..100])

Consider the following problem over statespace A:

F = { (a,b) $\in$ A×A | x(a)=x(b) $\wedge$ 2 · y(b) < x(a) }

Is the pair ({x:8, y:10}, {x:8, y:3}) in the problem F?

○ True

○ False

Quiz Score: **30** out of 30