8190

Concurrency Multiple Choice Assignment

Six Sample Questions...

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Name

Each of the following questions has exactly one correct answer. For each question, you may select one or more answers by checking the corresponding boxes. Your test is graded as follows:

- If you select only the correct answer, you receive 1 point.
- If you select k answers, one of which is correct, you receive $1/k$ points.
- If you select k answers, none of which is correct, you receive 0 points.
- If you leave a question blank, you receive $1/a$ points, where a is the number of possible answers.

Let σ be your accumulated points, n be the number of questions, and a_i the number of possible answers for the i'th question. Your percentage score is then:

$$\frac{\sigma - \sum_1^n 1/a_i}{n - \sum_1^n 1/a_i}$$

Note that perfect answers yield a score of 100% and random guessing yields a score of 0%.

Question 1
Given the following (FSP) model:

```
A = (a -> B),
B = (b -> B).

P = (q -> p -> P
    |p -> q -> P).

||C = (A) /{c/a}.
||Q = ({x,y}::P).
||S = ({x,y}::C || Q) \{x.{b,p},y.q}.
```

What is the alphabet of the FSP process `S`, α(S)?:

- *a* ☐ {x.b, x.c, y.b, y.c}
- *b* ☐ None of the other choices are correct.
- *c* ☐ {x.c, x.q, y.b, y.c, y.p}
- *d* ☐ {x.b, x.p, y.q}
- *e* ☐ {x.a, x.q, y.b, y.a, y.p}
- *f* ☐ {b, c, q, x, y}

Question 2
Can the following system deadlock?

```
X = (x.acq->crit->x.rel->X).
Y = (y.acq->crit->y.rel->Y).
LOCK = (acq->rel->LOCK).

||SYS = (X || Y || {x,y}::LOCK).
```

- *a* ☐ No.
- *b* ☐ Yes.

Question 3
`P||P` $\equiv$ `P` (automaton equivalence) is...

- *a* ☐ ...always true
- *b* ☐ ...sometimes true, sometimes false (depending on P).
- *c* ☐ ...never true

Question 4
Given the following (FSP) model, M, safety property, S, and liveness property, L:

```
P = (acq -> crit -> rel -> P).

LOCK = (acq -> rel -> LOCK).

property S = (x.acq -> x.crit -> x.rel -> S
             |y.acq -> y.crit -> y.rel -> S).

progress L = {x.crit, y.crit}

||M = ({x,y}:P || {x,y}::LOCK).
```

Which of the following property relationships are satisfied?:

- *a* ☐ `M` $\not\models$ `S` and `M` $\not\models$ `L` (i.e., M satisfies neither S, nor L)
- *b* ☐ `M` $\models$ `S` and `M` $\not\models$ `L` (i.e., M satisfies S, but not L)
- *c* ☐ `M` $\models$ `S` and `M` $\models$ `L` (i.e., M satisfies both S and L)
- *d* ☐ `M` $\not\models$ `S` and `M` $\models$ `L` (i.e., M satisfies L, but not S)

Question 5
What are FSP programs compiled into by the LTSA tool?

- *a* ☐ Finite State Machines.
- *b* ☐ Infinite State Machines.
- *c* ☐ Stateless Machines.

Question 6

Given the following three Java classes:

```
class Shared {
    static int x = 0;
}

class T1 extends Thread {
    public void run() {
        Shared.x = Shared.x + 1;
    }
}

class T2 extends Thread {
    public void run() {
        Shared.x = Shared.x * 2;
    }
}
```

What are the possible final values of `x`, assuming that `Shared.x` has the initial value of zero and that an instance of `T1` and an instance of `T2` are spawned and executed (each by its own thread)?

a ☐ {0,1,2}
b ☐ {1,2}
c ☐ {0,1}
d ☐ Any integer
e ☐ {2}