

CMPUT 272 Winter 2001: Section B3

Quiz

Thursday, Feb. 8

Time: 30 minutes

Weight: 10%

Total Points: 30

Last name:
First name:
Unix ID:

- This quiz is **open book**
- No calculators or other mechanical devices are allowed.
- This quiz should have 3 pages and 4 questions. You are responsible for checking that your exam booklet is complete.
- In the derivation questions you may only use basic rules of inference, (namely NE, NI, CE, CI, DE, DI, IE, II, EqE, EqI, RE, ContrI). Each step requires a justification (i.e. a **reference** to the formulas it is inferred from) and an annotation (i.e. the **name** of the inference rule used).

Question 1 [8 points]

Translate the following sentences into predicate logic using the predicates:

Even(x): indicates that x is an even number.

Odd(x): indicates that x is an odd number.

Prime(x): indicates that x is a prime number.

Div(x,y): indicates that x is evenly divisible by y. E.g. $\text{Div}(6,2)$ is true since $\frac{6}{2} = 3$.

The universe of discourse consists of the integers $\{\dots - 1, 0, 1, 2, 3 \dots 24 \dots\}$

1.a [2 pts]: The number 24 cannot be prime if 2 divides it.

1.b [2 pts]: There is an even prime number.

1.c [2 pts]: Not every number that divides 24 also divides 3.

1.d [2 pts]: A number is even exactly when it is divisible by 2.

Question 2 [8 points] The following is a derivation. Provide justifications and annotations.

environ

p0: B[] implies C[];

p1: not C[] & not A[];

begin

a0: not C[] by

--

; ==

--

a1: not A[] by

--

; ==

--

a2: now

assume b0: B[];

b1: C[] by

--

; ==

--

thus contradiction by

--

; ==

--

end;

a3: not B[] by

--

; ==

--

A[] or not B[] by

--

; ==

--

Question 3 [6 points]

3.a [2 pts]: Briefly describe two different ways of demonstrating the soundness of a derived inference rule.

1.

2.

3.b [4 pts]: Use one of these methods to demonstrate the soundness of the rule

$$\frac{\pi \Leftrightarrow \psi}{\pi \Rightarrow \psi}$$

Question 4 [8 points] Give a derivation of $D \wedge (B \text{ implies } E)$ given the premises below. Provide justifications and annotations.

```
environ
  p0: D & (B implies C);
  p1: C implies E;
begin
```

Qu	Mark	
1		8
2		8
3		6
4		8
Σ		30