TT, 2526.2
(ALMA/MATH)

Exam TT.1
(points: 50; bonus: $0^\flat$; time: 96')

Name:

2026-05-12

Choose one question from each "letter": **T**, **C**, **P**, **O**
Do *not* write your name in any other page besides this one.

(10) **T1.** Define (F/I/E/β/η) for one of: $(+)$, $(\times)$, $(\to)$.

(12) **T2.** Define (F/I/E/β/η) for one of: Σ, Π.

(12) **T3.** Show that with Σ we can define $(+), (\times)$. (Do we need something besides Σ?)

(12) **T4.** Show that with Π we can define $(\times), (\to)$. (Do we need something besides Π?)

(12) **C1.** Show that $(\times)$ in types deserves the name *product*.

(12) **C2.** Show that in the category **Abel**, $A \times B$ is a coproduct (sum) of A and B.

(12) **C3.** Show that in any category, split mono and epi implies iso.

(12) **C4.** Prove/refute: in **Set**, f is epic iff f is surjective.

(12) **P1.** The (poorly-named) "irrefutability of LEM": prove $\neg\neg(P \vee \neg P)$.

(12) **P2.** In our home-made language of proofs, write a proof of **one** of the following:

$$P \text{ decidable} \implies P \text{ stable}$$
$$P \text{ decidable} \impliedby P \text{ stable}$$

(12) **O1.** In any lattice, we have: $a \geq b \implies b \vee (d \wedge a) \leq (b \vee d) \wedge a$.

(14) **O2.** Any lattice with exponentials is distributive.

(12) **O3.** Let L be a lattice and $I \subseteq L$. Prove: I o-ideal $\iff$ I a-ideal.

(12) **O4.** Let L be a lattice and J an ideal of L. J is prime iff $L \setminus J$ is a filter.

Só isso mesmo.

Answer to ____ .

Answer to ____ .

Answer to ____ .

Answer to ____ .