Sets and Logic
MHF3202

SeLo-D

Prof. JLF King
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D1: The distinction between a ***multiset*** and just a ***set*** is ______________________________ .
____

Essay, on your own paper, triple-spaced: By strong induction, prove: THM. *For each posint n, there exists a finite multiset S_n of prime numbers such that $\prod(S_n) = n$.*

Short answer. *Henceforth, show no work. Simply fill-in each blank on the problem-sheet.*

D2: Relation R on a set Ω is a ***strict partial order*** iff R satisfies these 3 axioms: (Use the **word** and **QFN**.)

P1: R is __________ i.e __________ .

P2: R is __________ i.e __________
______________________________ .

P3: R is __________ i.e __________
______________________________ .

D3: Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

___ **z** If $\lim_{x\to 0+} 8/x$ equals ∞, then $\lim_{x\to 0+} 5/x$ is *Circle*:

Prof. King's cap   a comma

___ **a** A pair (B, E) of *distinct* positive irrationals with B^E *rational*, is either (____ , ____) or (____ , ____).

___ **b** The n^{th} Fibonacci number satisfies $\mathsf{f}_n = [\alpha^n - \beta^n] \cdot V$, for reals $\alpha=$ ______ , $\beta=$ ______ , $V=$ ____ .

___ **c** Repeating decimal $0.1\overline{54}$ equals $\frac{n}{d}$, where posints $n \perp d$ are $n=$ ______ and $d=$ ______ .

___ **d** LBolt: $\text{GCD}(70, 42) =$ ____ $\cdot 70 +$ ____ $\cdot 42$.

So (LBolt again) $G := \text{GCD}(70, 42, 105) =$ ______ and
____ $\cdot 70 +$ ____ $\cdot 42 +$ ____ $\cdot 105 = G$.

___ **e** The number of ways of picking 3 objects from 7 types is $\left[\!\left[{7 \atop 3} \right]\!\right] \stackrel{\text{Binom}}{\overline{\overline{\text{coeff}}}}$ (______). And

$\left[\!\left[{7 \atop 3} \right]\!\right] = \left[\!\left[{T \atop N} \right]\!\right]$, where $T=$ ______ $\neq 7$, and $N=$ ______ .

f+ *On $\mathbb{R}_+$, define several relations: Say that $x \mathcal{R} y$ IFF $y - x < 17$. Define $\mathcal{P}$ by: $x \mathcal{P} y$ IFF $x^{\log(y)} = 5$. Say that $x \mathcal{I} y$ IFF $x + y$ is irrational.*

Use $\bullet\!|$ for the "divides" relation on the positive integers: $k \bullet\!| n$ iff there exists a posint r with $rk = n$.

f₁ Please circle those of the following relations which are *transitive* (on their domain of defn).

$\neq$ $\bullet\!|$ $\leqslant$ $\mathcal{R}$ $\mathcal{P}$ $\mathcal{I}$

f₂ Circle the *symmetric* relations:

$\neq$ $\bullet\!|$ $\leqslant$ $\mathcal{R}$ $\mathcal{P}$ $\mathcal{I}$

f₃ Circle the *reflexive* relations:

$\neq$ $\bullet\!|$ $\leqslant$ $\mathcal{R}$ $\mathcal{P}$ $\mathcal{I}$

End of SeLo-D