Grading Rubric for The Midterm Experience – Spring 2022 Score: 81/100

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Good work on most. The functions/balls in boxes stuff apparently posed some trouble. Let me know if you'd like to make another attempt.

SE1: Lazering a Pizza

displayed $\binom{n}{4}+\binom{n}{2}+1$ or $\frac{n^4}{24}-\frac{n^3}{4}+\frac{23n^2}{24}-\frac{3n}{4}+1$.	0	1	2
Group supports answer	0	1	2
Group's answer is rigorously verified	0	1	2
Group acknowledges leaps of faith (points are free if the answer is rigorous)	0	1	2
Readability	0	1	2
Fluency	0	1	2

SE2: Weirdly Walking

City-Block Metric

[2.1] $\pi = 4 = \frac{8}{2}$	0	1	2
[2.1] Group uses def of π and of distance	0	1	2
Readability	0	1	2
Fluency	0	1	2
~~[2.2] Group discovers recurrence~~	~~0~~	~~1~~	~~2~~
[2.2] Group proves $\binom{X+Y}{Y \text{ or } X}$	0	1	2
~~[2.2] Pascal's id~~	~~0~~	~~1~~	~~2~~
[2.2] Count #Rs (Us) in R, U-sequence	0	1	2
Readability	0	1	2
Fluency	0	1	2

$p_n = \#\{U, R, L\}$-paths of length n with no "RL" or "LR".

$p_n = 2p_{n-1} + p_{n-2}$	0	1	2
... plus initial cond's & domain	0	1	2
attempts proof of recurrence	0	1	2
... and succeeds	0	1	2
attempts closed formula	0	1	2
... obtains $p_n = \frac{1}{2}(1+\sqrt{2})^{n+1} - \frac{1}{2}(1-\sqrt{2})^{n+1}$	0	1	2
Readability	0	1	2
Fluency:	0	1	2

SE3: The Twelve-Fold Way

3/entry: Correct fmla + proof (3); correct fmla + lame proof (2); correct fmla (1); incorrect fmla plus convincing argument (1)

Entry 1: $f : N_L \to X_L$	x^n	0	1	2	3
Entry 2: $f : N_L \overset{1-1}{\to} X_L$	$x^{\underline{n}}$	0	1	2	3
Entry 3: $f : N_L \overset{\text{onto}}{\to} X_L$	$x!\left\{ {n \atop x} \right\}$ close (sort of)	0	1	2	3
Entry 4: $f : N_U \to X_L$	$\left(\!\binom{n}{x}\!\right) = \binom{n+x-1}{x-1}$	0	1	2	3
Entry 5: $f : N_U \overset{1-1}{\to} X_L$	$\binom{x}{n}$	0	1	2	3
Entry 6: $f : N_U \overset{\text{onto}}{\to} X_L$	$\left(\!\binom{x}{n-x}\!\right) = \binom{n-1}{x-1}$	0	1	2	3
Entry 7: $f : N_L \to X_U$	$\sum_{i=1}^{x} \left\{ {n \atop x} \right\}$	0	1	2	3
Entry 8: $f : N_L \overset{1-1}{\to} X_U$	$[n \le x]$	0	1	2	3
Entry 9: $f : N_L \overset{\text{onto}}{\to} X_U$	$\left\{ {n \atop x} \right\}$	0	1	2	3
Entry 10: $f : N_U \to X_U$	$\sum_{i=1}^{x} p_i(n)$	0	1	2	3
Entry 11: $f : N_U \overset{1-1}{\to} X_U$	$[n \le x]$	0	1	2	3
Entry 12: $f : N_U \overset{\text{onto}}{\to} X_U$	$p_x(n)$	0	1	2	3

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SE4: Fun and Games

$T_n = 3^n - 1$ for $n \ge 0$	0	1	2
develops $T_n = 3T_n + 2$	0	1	2
... and proves	0	1	2
... includes initial conditions and domain	0	1	2
How long? A: 1.0888 sextillion centuries	0	1	2
• Readability	0	1	2
• Fluency:	0	1	2
NOT dots and boxes			
Clear indication Player A can win	0	1	2
... via choosing center edge	0	1	2
... and "mirroring"	0	1	2
Attempt at proof of strategy	0	1	2
... is correct	0	1	2
Readability & Clarity*	0	1	2
Fluency	0	1	2

SE5 Distasteful insensitive problem about suicide

• Group claims $S(n) = 2\left(n - 2^{\lfloor \log_2(n) \rfloor}\right) + 1$	0	1	2
• Group gives an argument for the formula	0	1	2
• Group displays recurrence relations	0	1	2
• Group argues the recurrence relations	0	1	2
• Group's argument for $S(n)$ is rigorous	0	1	2
• Readability	0	1	2
• Fluency:	0	1	2

BSE Number Theory

• Group makes attempt	0	1	2
• Group claims no ordering yields a prime	0	1	2
• claims 11 divides any ordering	0	1	2
• gives a cogent arg	0	1	2
• gives a rigorous arg	0	1	2
• Readability	0	1	2
• Fluency:	0	1	2

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Presentation: Evidence of effort put forth 0 1 2 3 4

Points: $X =$ 100 /128;

Score: $X \cdot \left\lceil \frac{100}{124} \right\rceil =$ 81 (/100)

*Reader knows how to use the strategy from reading this solution, as opposed to knowing the solution beforehand and interpreting.