Rubrics: **Analytical** vs. Holistic

(a) Torques : * Consistent choice of pivot;
Correct torque terms (2 or 3) . . . 1 pt.

* Correct signs, dimensions / units okay . . . 1 pt.

Forces : * $\sum \vec{F} = 0$ correct cpt signs . . . 1.5 pts.

Answer : * ans. indep. of F or T . . . 0.5 pts.

* algebra okay / correct final ans . . . 1 pt.

Rubrics: Analytical vs. **Holistic**

A holistic rubric, closely based on a rubric by Bruce Birkett and Andrew Elby:

Points	If…
5	The student clearly understands how to solve the problem. Minor mistakes and careless errors can appear insofar as they do not indicate a conceptual misunderstanding.[a]
4	The student understands the main concepts and problem-solving techniques, but has some minor yet non-trivial gaps in their reasoning.
3	The student has partially understood the problem. The student is not completely lost, but requires tutoring in some of the basic concepts. The student may have started out correctly, but gone on a tangent or not finished the problem.
2	The student has a poor understanding of the problem. The student may have gone in a not-entirely-wrong but unproductive direction, or attempted to solve the problem using pattern matching or by rote.
1	The student did not understand the problem. They may have written some appropriate formulas or diagrams, but nothing further. Or they may have done something entirely wrong.
0	The student wrote nothing or almost nothing.

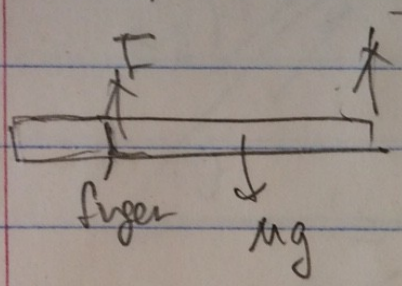
[a] This policy especially makes sense on exam problems, for which students are under time pressure and are more likely to make harmless algebraic mistakes. It would also be reasonable to have stricter standards for homework problems.

Rubric Results: Student 1

Problem A.

(a) FBD

2



$\Sigma \vec{\tau} = 0$ (sum of $\vec{\tau}$ = 0)

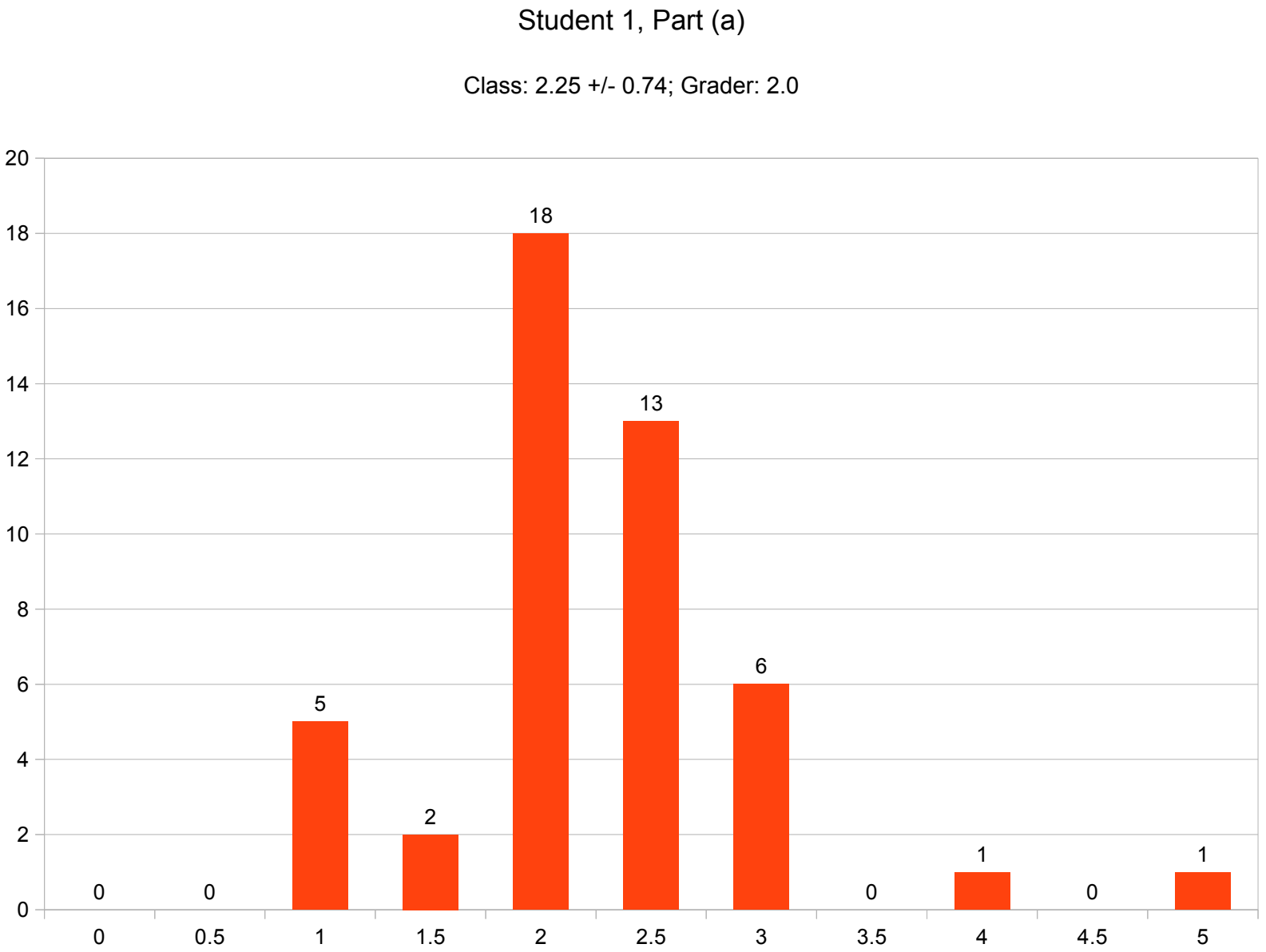
$(L-b) \cdot F + T \times L - Mg \times \frac{L}{2} = 0$ ✓

$T \times L = \frac{1}{2} MgL - (L-b)F$

$T = \boxed{\frac{1}{2} mg - F + \frac{b}{L} F}$ Not given F...

(b) If force from finger locates in the middle

Rubric Results: Student 1



Rubric Results: Student 1

$T = \left[\frac{1}{2}mg - F + \frac{b}{L}F\right]$, Not given F....

(b) If force from finger locates in the middle,
By considering ~~figure~~ ($\Sigma \vec{\tau} = 0$)

$\frac{L}{2}I + TL - Mg\frac{L}{2} = 0$ Same eq?

$I + 2TL - Mg = 0$

$2TL = Mg - F$

$T = \frac{1}{2L}(Mg - F)$ if $F \leq Mg$ could happen

if $F = mg$, then no tension.

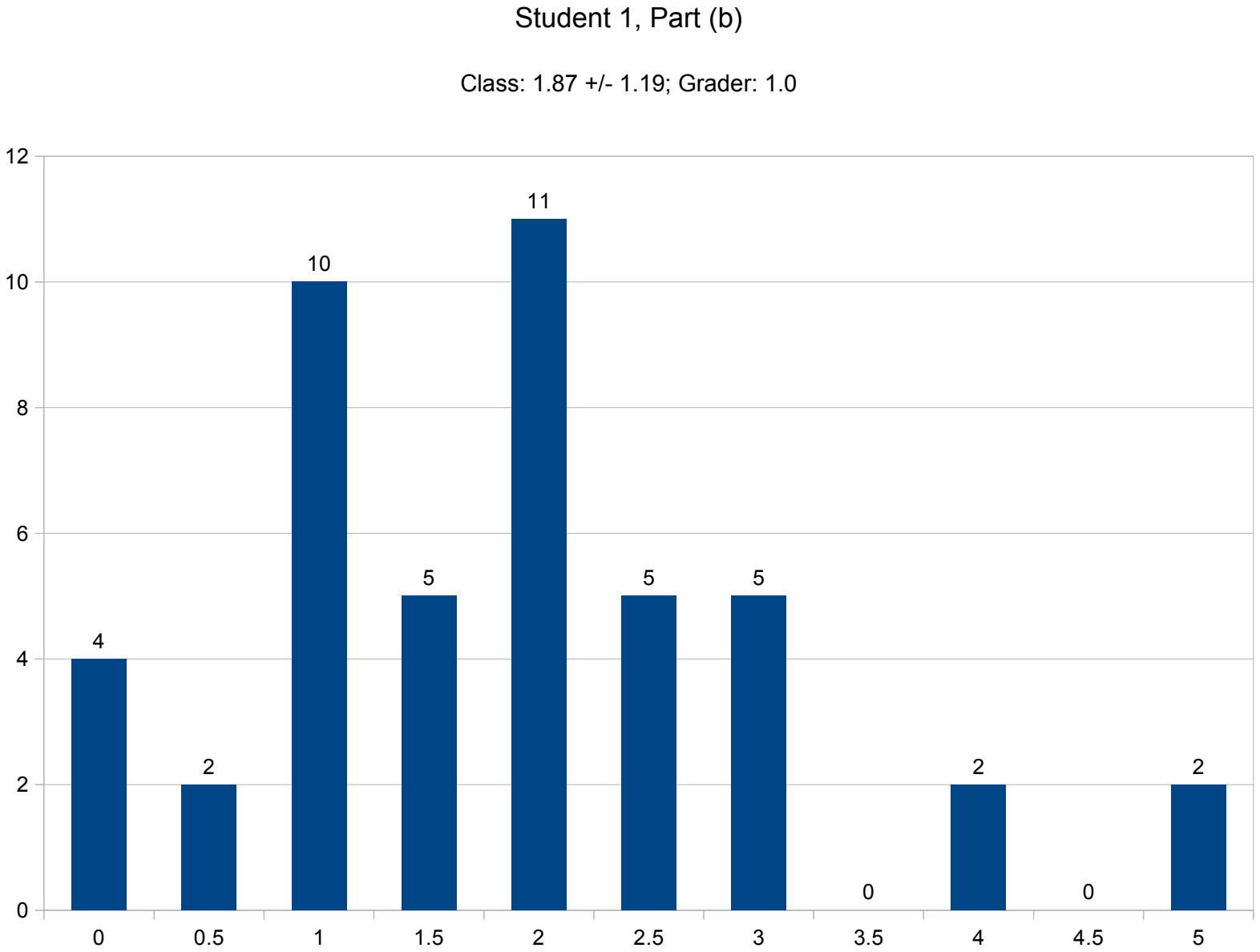
if $F > mg$ also no tension → ? Forces don't balance..

So, { tension exist if $F < Mg$
tension doesnot exist if $F \geq Mg$.

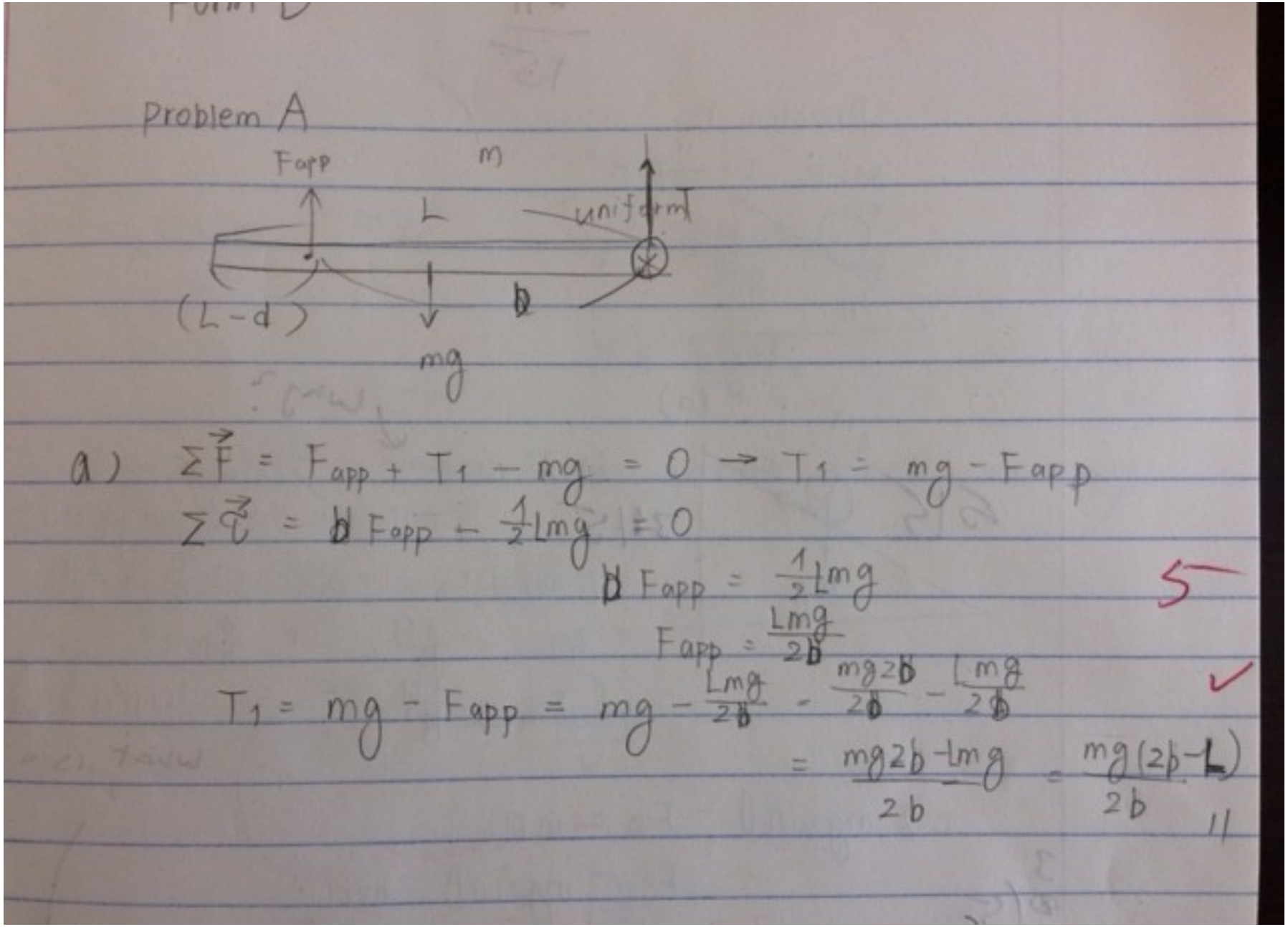
Unphysical b ?

$F > mg$?

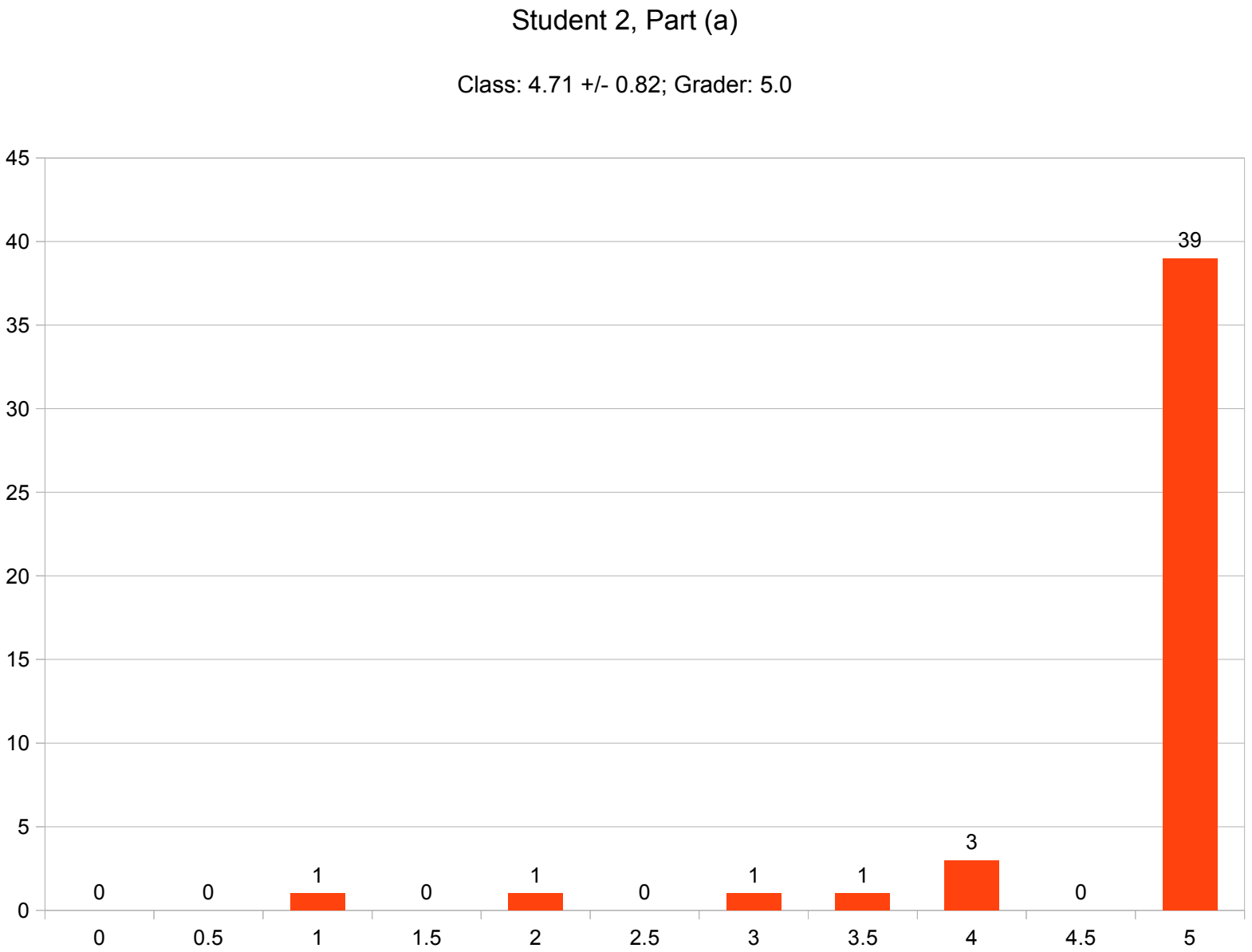
Rubric Results: Student 1



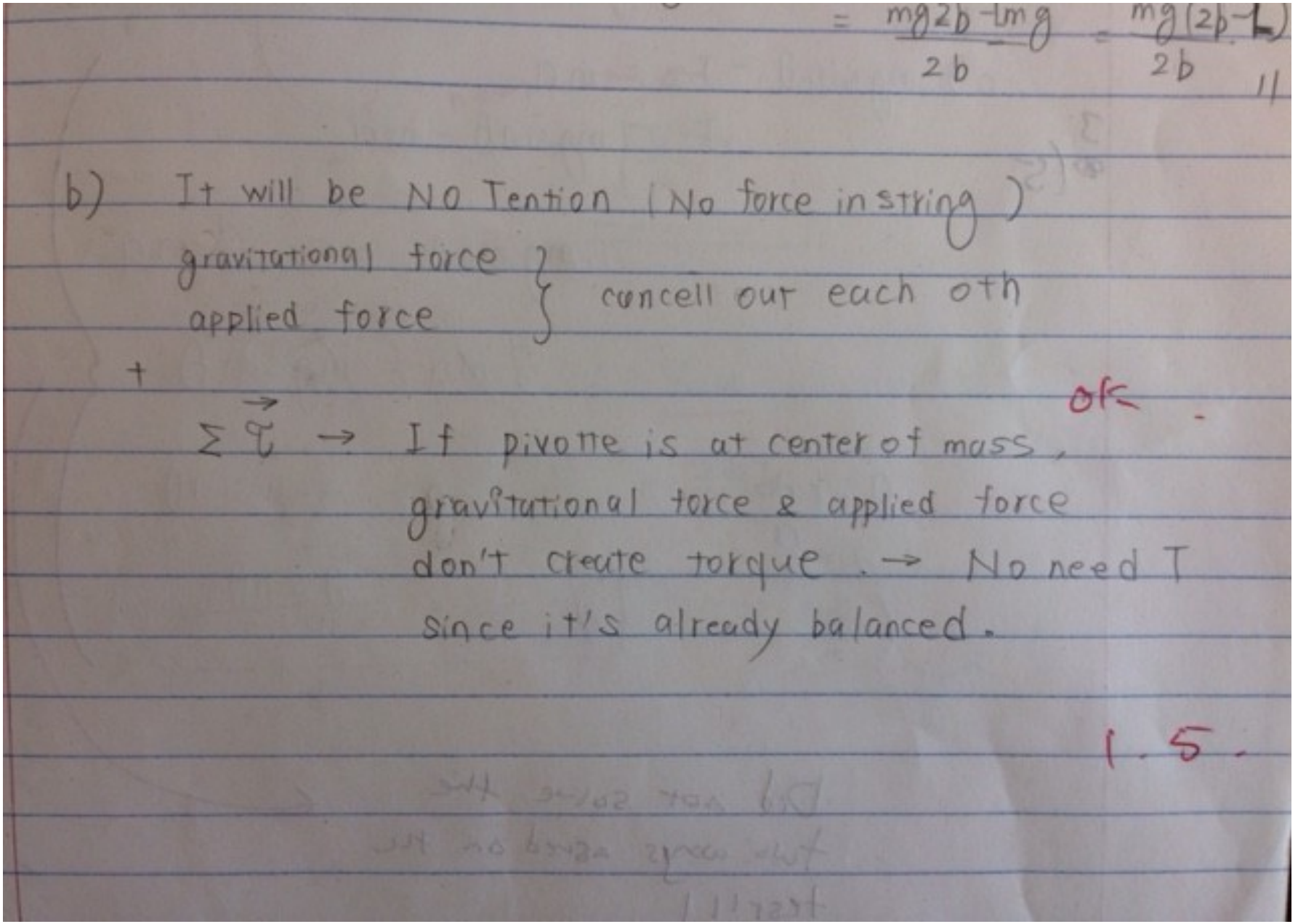
Rubric Results: Student 2



Rubric Results: Student 2



Rubric Results: Student 2



$= \frac{mg2b - bmg}{2b} = \frac{mg(2b-b)}{2b}$ //

b) It will be No Tention (No force in string)

gravitational force } cancell out each oth
applied force }

+

$\Sigma \vec{\tau}$ → If pivote is at center of mass, gravitational force & applied force don't create torque. → No need T since it's already balanced. ok.

1.5.

Rubric Results: Student 2