Attendance for Dr. Z.'s MathHistory for Lecture 8 (due no later than 10 minutes after class)

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Email to DrZlinear@gmail.com right after class

Subject: p8

with an attachment p8FirstLast.pdf

Part I: List all the "attendance questions" during the lecture, followed by your answers.

Part II:

1. Convert the fraction $\frac{11}{4}$ into a simple continued fraction.

$$x = \frac{11}{4} = 2 + \frac{3}{4}$$

$$= 2 + \frac{1}{4/3} = 2 + \frac{1}{1+\frac{1}{3}}$$

$$= 2 + \frac{1}{1+\frac{1}{3}} = 2 + \frac{1}{1+\frac{1}{3}}$$

$$\frac{11}{4} = 2 + \frac{1}{1+\frac{1}{3}}$$

2. Give in full detail, **any** (correct!) proof that $\sqrt{2}$ is irrational.

Suppose 2 positive integers, a and b, exist s.t. $\sqrt{2} = \frac{a}{b}$

$\sqrt{2} = \frac{a}{b}$ square both sides and rearrange

$a^2 = 2b^2$ If this exist, then there exists a pair (a,b) s.t. $(a+b)$ smallest possible value WLOG

B/c the square of an even number is even, and a^2 is even then a must be even in the form of $a = 2n \Rightarrow n = \frac{a}{2}$

$a^2 = 2b^2$

$(2n)^2 = 2b^2$

$4n^2 = 2b^2$

$b^2 = 2n^2$

$(2r)^2 = 2n^2$

$4r^2 = 2n^2$

$2r^2 = n^2$

Therefore (m,r) is also possible but

$(m+r) = \frac{a+b}{2} < (a+b) \rightarrow\leftarrow$

By the same logic b^2 is even so b must be even

$b = 2r \Rightarrow r = \frac{b}{2}$

Quin Boob
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~~AQ1~~: Who proved π is irrational?
Johann Heinrich Lambert

AQ 2: Who proved π is Transcendental?
Ferdinand von Lindemann

AQ3: Use this style of reasoning to prove $\sqrt{3}$ is irrational

Suppose 2 positive integers a and b exist s.t. $\sqrt{3} = \frac{a}{b}$

$\sqrt{3} = \frac{a}{b}$ square both sides

$3 = \frac{a^2}{b^2}$ rearrange

$a^2 = 3b^2$ where both a and b are positive integers

If this exists, there exists the pair (a,b) w/ smallest value of $(a+b)$

WLOG: $(a+b)$ are the smallest possible value

We know the square of an odd integer is odd: $(2n+1)^2 = 2m+1$

where $m = 2(m^2+m)$

and that the square of ~~a~~ an even number is even

$a = 2n$ for some integer $n \Rightarrow n = \frac{a}{2}$

go back

$a^2 = 3b^2$

$(2n)^2 = 3b^2$

$4n^2 = 3b^2$

$b^2 = \frac{4}{3}n^2$ where ~~n^2 must be~~ $2 = n^2 = \sqrt{3}\, m / \sqrt{2} = b^2 = 2z^2$

From similiar reasoning b must also be even of the form $2d$

$b = 2\cancel{d}z \Rightarrow d = \frac{B}{2}$

$(2n)^2 = 2z^2$

$4n^2 = 2z^2$

$2n^2 = z^2$

Therefor n and z are also possible

$(n+z) = \frac{a+b}{2} < (a+b) \rightarrow\leftarrow$

AQ 4: ~~What~~ Why is $\frac{355}{113}$ famous?

It is an approximation of π to the 6^{th} decimal place