

Hist - Exercises 1

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 About Past Exams.

1(i) If $n \in \mathbb{N}$, show that $\frac{1}{n+1} < \frac{3}{3n+2} < \frac{1}{n}$.

(ii) Use the Greedy algorithm to find an Egyptian unit fraction for $\frac{3}{3n+2} = \frac{1}{n+1} + \dots$

(iii) Write the Babylonian ~~number~~ $3'20''$ in standard form a/b where $a, b \in \mathbb{N}$. $\frac{3}{60} + \frac{20}{60^2}$

Why not!

2. Let p be an odd prime. Prove that $\frac{28p}{3}$ is not a perfect number. $\{1, 2, 4, 7, 14, 28, p, 2p, \dots, p^2\} = 56 + 28p$

3. What is a pentagonal number? The n^{th} pentagonal number P_n is given by the formula $\sum_{k=1}^n 3k-2$. Prove that $P_n = \frac{1}{2}n(3n-1)$.

Simple I know from Book 2!

4. One classical Greek construction for duplicating the cube involved the intersection point of two parabolas. If C_1 is the parabola $y=x^2$, and C_2 is the parabola $2x=y^2$, show that they meet at a point $(x,y) \neq (0,0)$ such that ~~at~~ one of x , or y is $\sqrt[3]{2}$.

ufile.io/4tag6

5. Note that $\frac{3}{5} = \frac{1}{2} + \frac{1}{10}$, but also $\frac{3}{5} = \frac{1}{3} + \frac{1}{6} + \frac{1}{9}$ for $a > b$. [hint $4 = 3+1$]

6. Write the number ~~9999~~ ~~123456789~~ in

(i) ~~base~~ hexadecimal (ii) base-12

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 PCS Page!
 Letter of Rec'd!
 Schultz stuff

#4 on
 Exercises on
 Histogram.pdf.

(i) Show that $\frac{2}{mn} = \frac{1}{mk} + \frac{1}{nk}$ for $k = \frac{m+n}{2}$.

(ii) Find a unit fraction decomposition for $\frac{2}{7}$ and for $\frac{2}{35}$.