

EXERCISES RELATED TO history07.pdf

As in the earlier exercises, “Burton” refers to the Seventh Edition of the course text by Burton (the page numbers for the Sixth Edition may be off slightly).

- Burton, p. 285: 6(a), 7, 9–11, 16, 17

[*Hint for 6(a)*: Start with $a^2 < b^2 < c^2$ in an arithmetic progression with constant difference d , and multiply everything by some constant y^2 , so that $x = yb$; the new sequence is again an arithmetic progression, so it suffices to choose y so that $y^2d = 2x$.]

- Burton, p. 292: 1, 3, 7(d), 8

Additional exercises

1. Prove the following result stated by Jordanus de Nemore: Given positive numbers x, r_1, \dots, r_{n-1} , then there are unique positive numbers x_1, \dots, x_n such that $x = \sum_k x_k$ and $r_i = x_{i+1}/x_i$ for $i = 1, \dots, n - 1$.

2. Find the sum of the infinite series

$$\sum_{n=1}^{\infty} \frac{n(n+1)}{2^n}$$

by taking the second derivative of the power series expansion for $1/(1-x)$ at $x = \frac{1}{2}$, evaluating it using standard methods from differential calculus, and comparing these to the given series.

3. Solve the following well known problem from *Problems for the Quickening of the Mind*, which may have been compiled by Alcuin of York: A wolf, a goat and a cabbage must be moved across a river by a raft which only has room for one of these and the person steering the raft. If the wolf and goat are left alone, then the wolf will eat the goat, and if the goat and cabbage are left alone, then the goat will eat the cabbage. How can the wolf, goat and cabbage all be transported successfully across the river?