MATH4350
Homework Assignment

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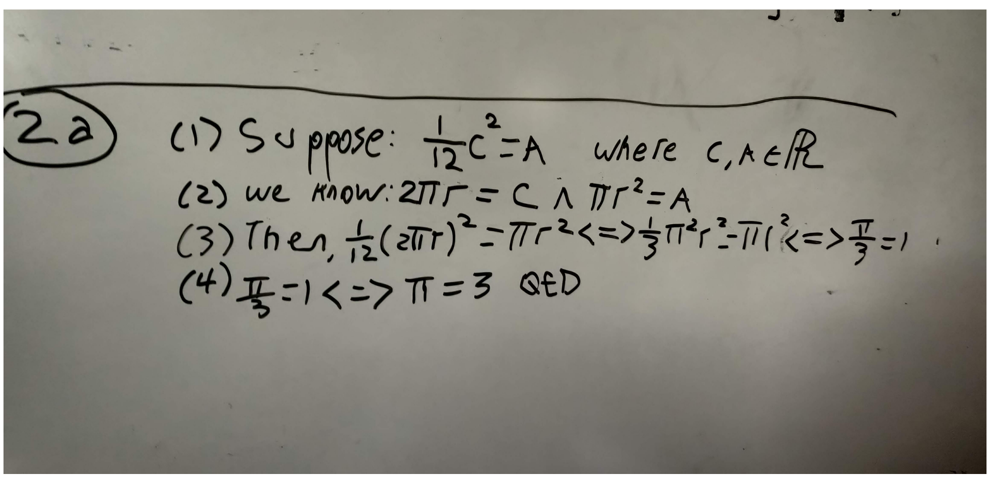
2a. The Babylonians generally determined the area of a circle by taking it as equal to $\frac{1}{12}$ the square of the circle's circumference. Show that this is equivalent to letting $\pi = 3$.



2a

(1) Suppose: $\frac{1}{12}C^2 = A$ where $C, A \in \mathbb{R}$

(2) we know: $2\pi r = C \wedge \pi r^2 = A$

(3) Then, $\frac{1}{12}(2\pi r)^2 = \pi r^2 \iff \frac{1}{3}\pi^2 r^2 = \pi r^2 \iff \frac{\pi}{3} = 1$.

(4) $\frac{\pi}{3} = 1 \iff \pi = 3$ QED

2b. A Babylonian tablet excavated in 1936 asserts that when a more accurate determination of area is needed, the $\frac{1}{12}$ should be multiplied by 0;57,36, that is, by $\frac{24}{25}$. What value for π does this correction factor yield?

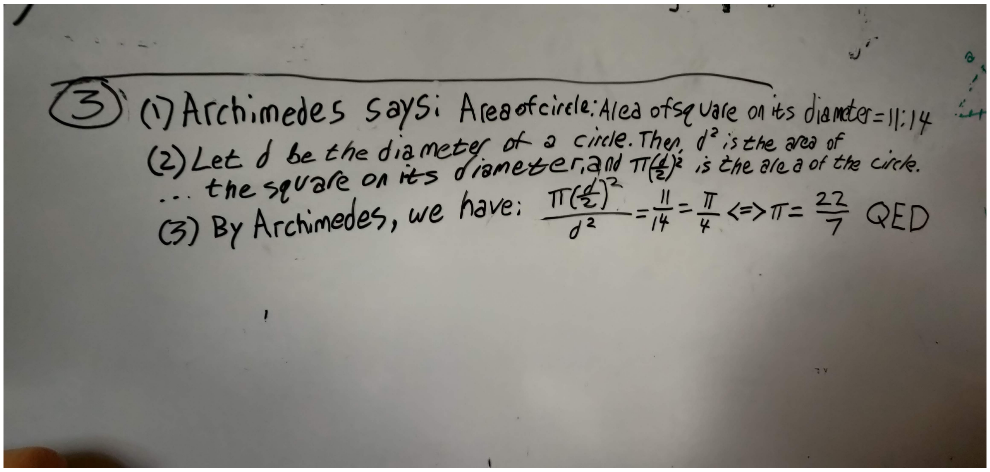
(2b) (1) Suppose $\left(\frac{24}{25}\cdot\frac{1}{12}\right)c^2=A$

(2) we know: $c=2\pi r \wedge A=\pi r^2$

(3) $\frac{24}{25}\cdot\frac{1}{12}=\frac{24}{300}=\frac{2}{25} \iff \left(\frac{24}{25}\cdot\frac{1}{12}\right)c^2=A \iff \frac{2}{25}(2\pi r)^2=\pi r^2$

(4) $\frac{8}{25}\pi^2 r^2=\pi r^2 \iff \frac{8\pi}{25}=1 \iff \pi=\frac{25}{8}=3.125$ QED

3. Archimedes (about 287–212 B.C.) in his book *Measurement of a Circle* stated: The area of a circle is to the square on its diameter as 11 to 14. Show that this geometric rule leads to $\frac{22}{7}$ for the value of π.



4. The sixth-century Hindu mathematician Aryabhata had the following procedure for finding the area of a circle: Half the circumference multiplied by half the diameter is the area of a circle. How accurate is this rule?