Math 181

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Hippocrates argued:

1. Area $AB^2 = 2AC^2$

   > This equates the area of the inscribed square to a square with side length equal to the diameter of the circle.
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   > This follows from the Pythagorean theorem.

2. The halfcircle $ACB = 2 \cdot AEC$

   > The large circle is twice the size of the large circle.

3. $\frac{1}{2}$ of the small circle, is $\frac{1}{4}$ of the large circle. Which means $AEC = AC$ Where AC is a quadrant of the large circle.

4. Since the quadrant and the half circle overlap, by finding the area of the quadrant which does not overlap the half circle, we can find the area of the lune.

   > The triangle ACD where D is the center of the large circle has side lengths 1. This means the area is $1^2 \times \frac{1}{2}$ which is $\frac{1}{2}$

Greeks thought the way you should reason about the world is to start from agreed upon facts and deduce consequences. This is the start of axioms and proofs.

Hippocrates appears to use the following axioms:

- Pythagorean Theorem (Probably misnamed)

  > Comes up lots when surveying or in agriculture and land management.

- Angle on a circle's diameter is right

  > This comes from the parallel postulate, it means the final triangle is easy to compute the area becuase the interior angle is right.

- Similar circles take up similar fractions of similar squares.

  > Both circles are some fraction of a square. They take up the same fraction of a square which has side length equal to its diameter.

How did we know Hippocrates did it?

> We don't have original manuscripts. We have nothing from his lifetime. We have several degrees removed summaries of his work.
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> We have work from Simplicius (490-560AD) around the time Christianity took off. Hippocrates lived around (470-421 BC) which is nearly 1000 year difference.
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> Simplicius is actually just quoting Eudemus' History of Geometry (370-300BC). Simplicius was mostly discussing Aristotle and quoted Eudemus which mentioned Hippocrates incidently. Still nearly 100 years after, and Eudemus likely did not have access to Hipocrates original work.
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> Simlicius does not distinguish quotes, however textual analysis shows more archaic Greek which indicates a quotation.

Some Circumstantial evidence:

1. Hippocrates is dated to time when people started writing single authored texts

   > Earlier texts were inventories, tax records, text which was not attributed to any individual.

2. Lots of math after him.

   > Unlike Pythagoras we see mathematics immediately after Hippocrates, where people were building on his ideas.

3. Hippocrates is Obscure

   > Unlike Pythagoras who was mythologized in many ways, Hippocrates was relatively unknown and unlikely to be overly exaggerated or mythologized.

> I think its funny how the professor prounounces Eudemus differently every time.