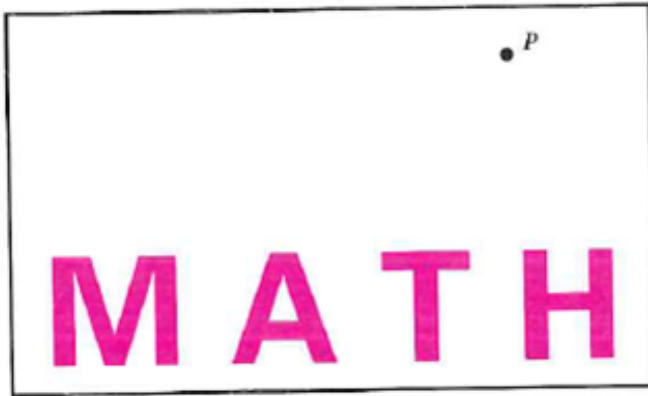# MGF1107 Exam 2

1. Make the letters M, A, T, and H in the figure below into three-dimensional, solid, letters. The given letters should be used as the front faces of three-dimensional letters as deep as the T is wide, and all letteers should be drawn with correct perspective relative to the given vanishing point, P.

2. Which of the following regular polygons *cannot* be used to make a tiling?

   (a) equilateral triangles
   (b) regular hexagons
   (c) regular octagons

3. *All* lines that are parallel in a real scene converge in a painting

   (a) at the principal vanishing point.
   (b) somewhere along the horizon line.
   (c) somewhere along the top edge of the painting.

4. The letter Z has

   (a) reflection symmetry.
   (b) translation symmetry.
   (c) rotation symmetry.
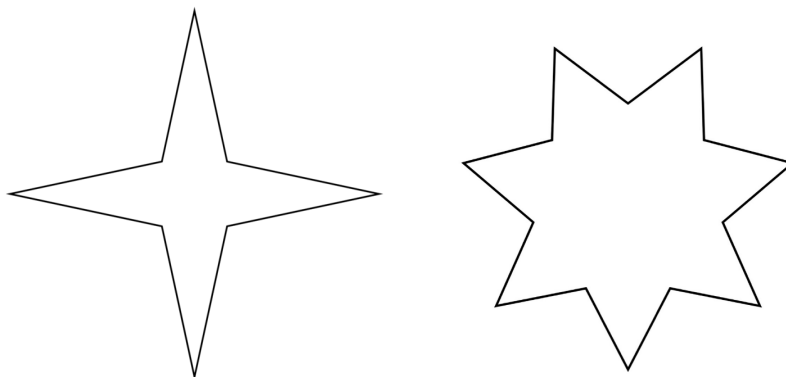
5. (a) How many reflection symmetries does a four-pointed star have?

   (b) How many rotational symmetries does a seven-pointed star have?

6. Which of the following is *not* a characteristic of the golden ratio?

   (a) It is an irrational number.

   (b) It is betweeen 1 and 2.

   (c) It is the fourth number in the Fibonacci sequence.

7. A line is subdivided according to the golden ratio, with the smaller piece having a length of 5 meters. What is the length of the entire line?

8. The property that defines the golden ratio is

$$\frac{L}{1} = \frac{L+1}{L}$$

   (a) Show that, if we multiply both sides by L and rearrange, this equation becomes

$$L^2 - L - 1 = 0$$

   Confirm that substituting the value of ϕ for L satisfies this equation.

   (b) The quadratic formula states that, for any equation of the form

$$ax^2 + bx + c = 0$$

   The solutions are given by

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

   and

$$x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

   Use the quadratic formula to solve for L in the formula for the golden ratio. Show that one of the roots is ϕ.

9. The 18th, 19th, and 20th numbers in the Fibonacci sequence are

$$F_{18} = 2584, \ F_{19} = 4181, \ F_{6765} = 6765$$

What is the 21st number, F_{21}, of the sequence?

10. In what way does the golden ratio appear in the Fibonacci sequence?

11. Of the 100 senators in the U.S. Senate, 62 favor a new bill on health care reform. The opposing senators start a filibuster. Is the bill likely to pass?

12. A criminal conviction in a particular state requires a vote by 2/3 of the jury members. On an 11-member jury, 7 jurors vote to convict. Will the defendant be convicted?

13. A tax increase bill has the support of 68 out of 100 senators and 270 out of 435 members of the House of Representatives. The president promises to veto the bill if it is passed. Is it likely to become law?

14. According to the bylaws of a corporation, a 2/3 vote of the shareholders is needed to approve a merger. Of the 10,100 shareholders voting on a certain merger, 6650 approve of the merger. Will the merger happen?