# Exam 2
Math 213

Show *all* your work on the following. A right answer with no supporting work will receive no credit.

1. For the following questions use the arithmetic sequence with the first few following terms:

Number of term:	1	2	3	4	5
Term:	-1	$-\dfrac{1}{3}$	$\dfrac{1}{3}$	1	$\dfrac{5}{3}$

   (a) [4] What is the formula for the nth term? (Not a recursive definition, but one in which a_n is defined in terms of a_1.)
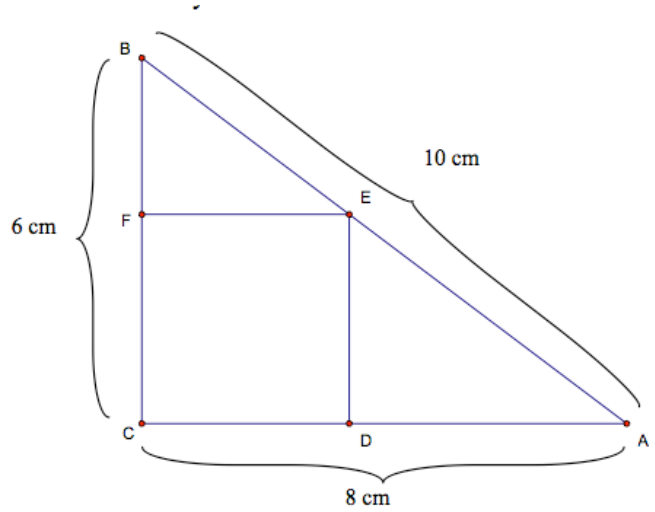
   (b) [4] Plot the first few points on the axis below.
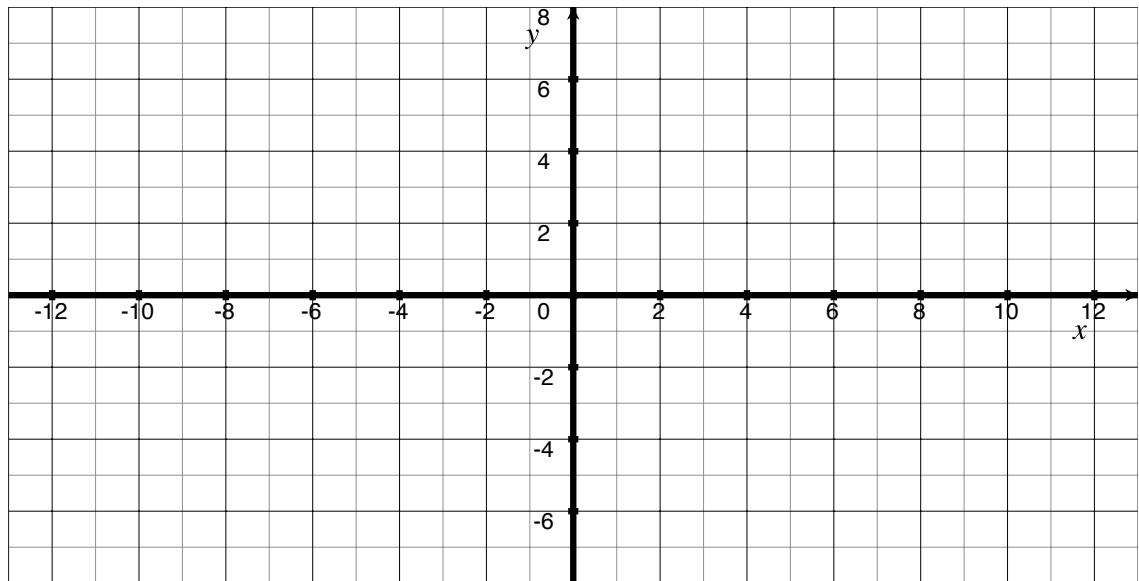
   (c) [5] Find the formula for the line you just drew.

2. [6] Find the equation of the image when the line described by $y = -x + 3$ is reflected about the x-axis.

3. [8] In the triangle ABC, a square has been inscribed as shown. Find the length of a side of the square.

4. [5] In the following triangle, E is the midsegment of $\overline{CA}$, $\angle BCA \cong 90°$, and $\angle CDA \cong$ 90°. Find BD if possible. If not possible, explain why
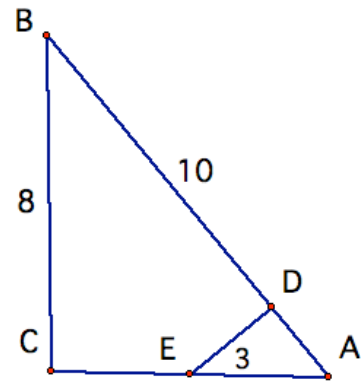
5. Choose *ONE* of the following to *construct* and *justify* your steps. (Note, theorems are appropriate to cite here.)

   (a) [10] Use only a compass and a straight edge to inscribe a circle in the triangle *MNO*. *Justify* why the center of your inscribed circle is the appropriate point. (You can cite theorems here.)
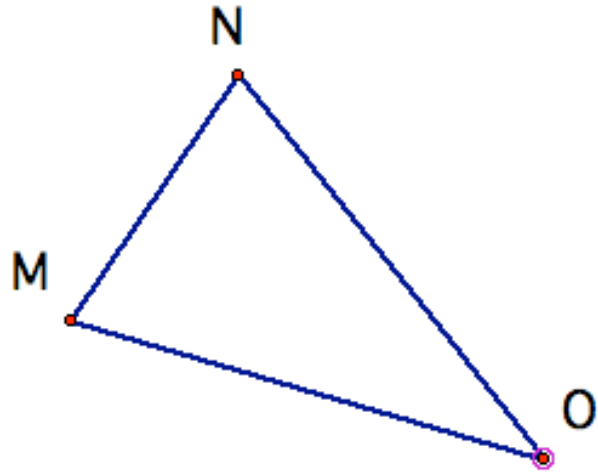
   (b) [10] Use only a compass and a straight edge to divide the line segment $\overline{AB}$ into five congruent line segments. *Justify* why the line segments you created are all congruent. (You can cite theorems. here.)

6. Choose *ONE* of the following statements to *prove.*

    (a) [8] The picture below shows a rhombus labeled ABCD. *Prove* that the diagonals are perpendicular to each other. (You must use congruent or similar triangles.)
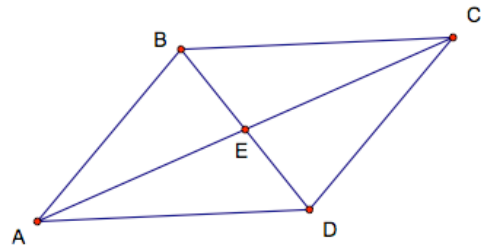
    (b) [8] Recall by definition a parallelogram is a quadrilateral in which each pair of opposite sides are parallel. (Note, you are *not* given that the opposite sides are congruent.) In the following picture $ABCD$ is a parallelogram. *Prove* that E is the midpoint of $\overline{AC}$ and $\overline{BD}$.