

Serial #: \_\_\_\_\_ ID \_\_\_\_\_ NAME \_\_\_\_\_

Show all necessary steps for full marks.

**Question 1: (6 points) (1.1 Textbook Exercise 54):** Solve  $\frac{x-1}{2a} = 2x - a$  for  $x = ?$ **Solution:**

$$\begin{aligned}
 54. \quad & \frac{x-1}{2a} = 2x - a \\
 & 2a \left[ \frac{x-1}{2a} \right] = 2a(2x - a) \\
 & x - 1 = 4ax - 2a^2 \\
 & x = 4ax - 2a^2 + 1 \\
 & x - 4ax = -2a^2 + 1 \\
 & x(1 - 4a) = -2a^2 + 1 \\
 & x = \frac{-2a^2 + 1}{1 - 4a} = \frac{1 - 2a^2}{1 - 4a}
 \end{aligned}$$

**Question 2: (7 points) (1.2 Textbook Exercise 13):** The perimeter of a triangular plot of land is 2400 ft. The **longest side** is 200 ft less than twice the **shortest side**. The **middle side** is 200 ft less than the longest side. Find the lengths of the three sides of the triangular plot.**Solution:**13. Let  $x$  = the length of the shortest side.Then  $2x - 200$  = the length of the longest side

and the length of the middle side is

$$(2x - 200) - 200 = 2x - 400.$$

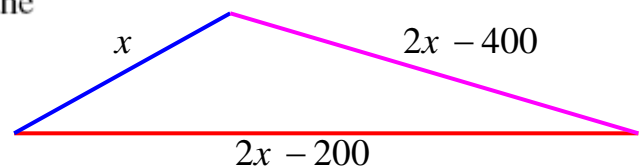
The perimeter of a triangle is the sum of the measures of the three sides.

$$x + (2x - 200) + (2x - 400) = 2400$$

$$x + 2x - 200 + 2x - 400 = 2400$$

$$5x - 600 = 2400$$

$$5x = 3000 \Rightarrow x = 600$$

The **shortest side** is 600 ft.The **middle side** is 800 ft.The **longest side** is 1000 ft.**Question 3: (7 points)** Write the complex number  $\frac{\sqrt{-2}\sqrt{-8} + i^{235}}{1+i}$  in the **standard** form and find it**conjugate.****Solution:**

$$\begin{aligned}
 \frac{\sqrt{-2}\sqrt{-8} + i^{235}}{1+i} &= \frac{(\sqrt{2})i(\sqrt{8})i + (i^2)^{117}i}{1+i} = \frac{(\sqrt{2})(2\sqrt{2})i^2 + (-1)^{117}i}{1+i} \\
 &= \frac{4(-1) + (-1)i}{1+i} = \frac{-4 - i}{1+i} = \frac{(-4 - i)(1 - i)}{(1+i)(1-i)} = \frac{-4 + 4i - i + i^2}{2} = \frac{-5 + 3i}{2} = -\frac{5}{2} + \frac{3}{2}i
 \end{aligned}$$

The conjugate is:  $-\frac{5}{2} - \frac{3}{2}i$