1. (8 points) Write the complex numbers in the standard form \( a + bi \), where \( a, b \) are real numbers:
   (a) \( \sqrt{-16} + i^{11} \)
   (b) \( \frac{1 + i}{2 - i} \)

2. (7 points) State the Quadratic Formula (for the solutions of the general quadratic \( ax^2 + bx + c = 0 \)) and use it to solve the equation \( x^2 + 29 - 10x = 0 \). Specify your values of \( a, b, c \) and simplify your answer.

3. (10 points) Find all \( x \) that satisfy the equation \( \frac{x}{x + 2} + \frac{12}{x^2 - 4} = \frac{3}{x - 2} \).

4. (10 points) Find all the real numbers \( x \) which satisfy the equation \( \sqrt{x + 8} - 6 = x \).

5. (6 points) (a) The slope \( m_1 \) of the line \( 3x + 2y = 7 \) is \( m_1 = \) ______.
   (b) The slope \( m_2 \) of a line perpendicular to the line in (a) is \( m_2 = \) ______.
6. (6 points) (a) The slope $m$ of the line passing through $(1, -2)$ and $(-2, 7)$ is $m = \_\_\_\_\_\_\_.

(b) An equation for the line passing through the points in (a) is $y = \_\_\_\_\_\_\_.

7. (7 points) Sketch the graph of the piecewise-defined function

$$f(x) = \begin{cases} 
2, & x \geq 0, \\
3x + 6, & x < 0.
\end{cases}$$

8. (8 points) For the graph of the quadratic

$$y = 9x^2 - 6x - 1$$

(a) Find the vertex. Is it a relative maximum or minimum?

(b) Find the $x$-intercepts if any (give exact values not a calculator approximation).

9. (6 points) (a) Test to see whether the function $f(x) = x^3 + \frac{1}{x^3}$ is even, odd or neither.

(b) Test whether the graph of $x^2 + y^2 = xy + 1$ is symmetric about the origin.

10. (6 points) Solve the linear equation for $x$. Give an exact answer, not a calculator approximation.

$$\sqrt{2}(x + 9) = 3(x + \sqrt{2}) - \sqrt{2}$$
11. (9 points) The graph of \( y = f(x) \) is shown on the first set of axes. Sketch the graphs requested on the other two. Underneath describe the transformations in words.

\[
\begin{align*}
y &= f(x) \\
y &= f(x + 1) \\
y &= -2f(x)
\end{align*}
\]

12. (8 points) (a) Use your calculator to graph the function

\[ f(x) = x^3 - x^2 - 12x + 15 \]

from \( x = -5 \) to \( x = 5 \) (use zoomfit for the \( y \) values and label your axes with the resulting \( y \) range).

(b) Give the coordinates (to 3 decimal places) of the points:

relative maximum =_____________________

relative minimum =_____________________

(c) Specify the interval(s) on which the function is increasing.

13. (9 points) A gardener has 2000 yards of fencing to enclose four adjacent plots as shown. Let \( x \) denote the width of the enclosure and \( y \) its total length.

(a) Write the length \( y \) in terms of \( x \):

(b) Write the total area enclosed in terms of \( x \):

(c) What choice of \( x \) maximizes this area? Justify your answer.