1. (15 points) Consider the quadratic function $g(x) = 2x^2 - 12x + 9$.
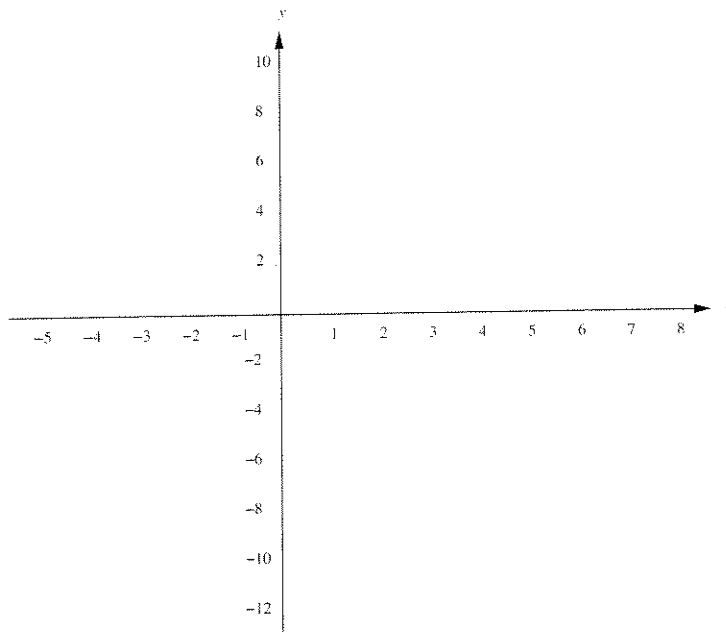
(a) $g(-2) =$

(b) State the roots of this function in reduced radical form.

(c) State the y-intercept.

(d) Determine the vertex.

(e) Sketch the graph of this function.

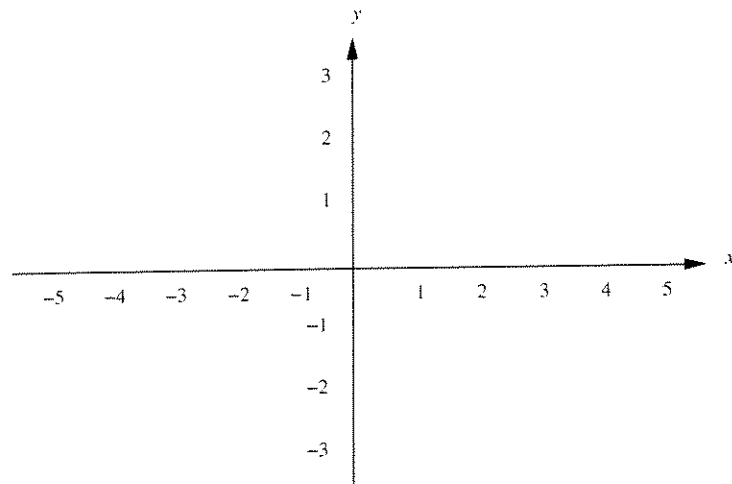2. (15 points) Let $f(x) = \dfrac{x(x-2)}{(x+1)(x-3)}$.

(a) Write the equations for the vertical asymptotes (poles).

(b) Write the equation for the horizontal asymptotes.

(c) Find the y-intercept

(d) Find the x-intercepts.

(e) Sketch the graph of this function.

3. (15 points) Solve each of these for x. Beware of domain restrictions.

(a) $\ln(x + 1) + \ln(x - 1) = \ln 3$

(b) $8 = 4e^{3x}$

(c) $\log_2\left(\dfrac{1}{64}\right) = x$

4. (8 points) Solve $\begin{cases} x^2 & - & y & = & -3 \\ 2x & + & y & = & 18 \end{cases}$

5. (7 points) Determine **all three** roots of this equation, writing them in reduced radical form,

$$x^3 + x^2 + x - 3 = 0.$$

6. Let $A = \begin{bmatrix} 1 & 1 & -5 \\ 1 & 0 & -2 \\ 2 & -1 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 5 \\ 2 & -4 \end{bmatrix}$, and $C = \begin{bmatrix} 2 \\ -5 \end{bmatrix}$.

(a) Find the determinants of A and B.

(b) Find the inverse of B.

(c) Write a set of linear equations in x and y using matrices B and C.
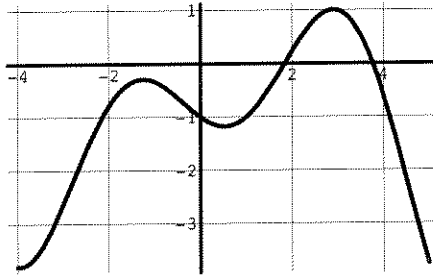
(d) Solve your system for x and y.

7. (6 points) For the seqence, $a_n = (-1)^n(3n - 2)$.

    (a) Write the first five terms of this sequence.

    (b) $\displaystyle\sum_{j=1}^{5} a_j =$

8. (4 points) Expand and write in decreasing powers of x: $(2x - y)^4$.

9. (15 points) Let $f(x) = \sqrt{6 - 5x}$, and let $g(x)$ be the function in the graph:

Find these:

(a) $f(-2) =$

(b) $g(3) =$

(c) The x-intercepts of $g(x)$ are

(d) The y-intercept of $f(x)$ is

(e) $g \circ f(-2) =$

(f) Find the inverse of $f(x)$, and state the domain of the inverse.