1. (8pts) Use the distance formula to find out whether the triangle with vertices $A = (-1, -3)$, $B = (3, 0)$ and $C = (0, 2)$ is an isosceles triangle.

$d(A,B) = \sqrt{(3-(-1))^2 + (0-(-3))^2} = \sqrt{4^2 + 3^2} = \sqrt{25} = 5$

$d(B,C) = \sqrt{(0-3)^2 + (2-0)^2} = \sqrt{(-3)^2 + 2^2} = \sqrt{13}$

$d(A,C) = \sqrt{(0-(-1))^2 + (2-(-3))^2} = \sqrt{1^2 + 5^2} = \sqrt{26}$

no two sides have equal length, so it is not isosceles

2. (8pts) Write the equation of the circle whose diameter has endpoints $(4, -3)$ and $(-2, -1)$. Sketch the circle.
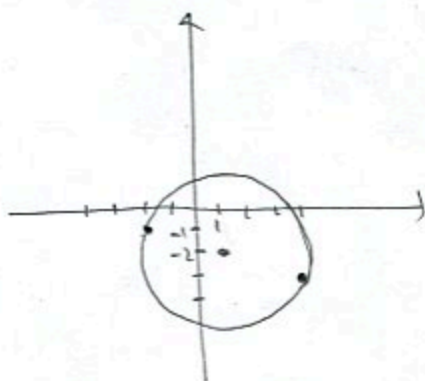
Center $= \left(\frac{4-2}{2}, \frac{-3-1}{2}\right) = (1, -2)$

r = distance from $(1, -2)$ to $(4, -3)$
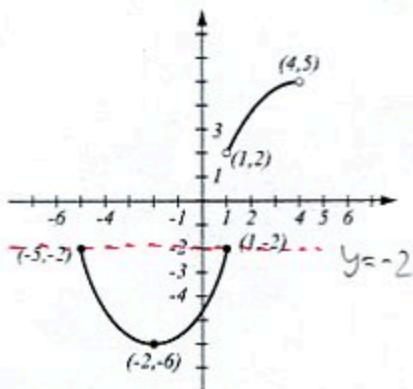
$= \sqrt{(4-1)^2 + (-3-(-2))^2} = \sqrt{3^2 + (-1)^2} = \sqrt{10}$

Eq of circle: $(x-1)^2 + (y-(-2))^2 = \sqrt{10}^2$

$(x-1)^2 + (y+2)^2 = 10$

3. (8pts) Use the graph of the function f at right to answer the following questions.

a) Find $f(-2)$ and $f(1)$.

b) What is the domain of f?

c) What is the range of f?

d) What are the solutions of the equation $f(x) = -2$?

a) $f(-2) = -6$ $f(1) = -2$

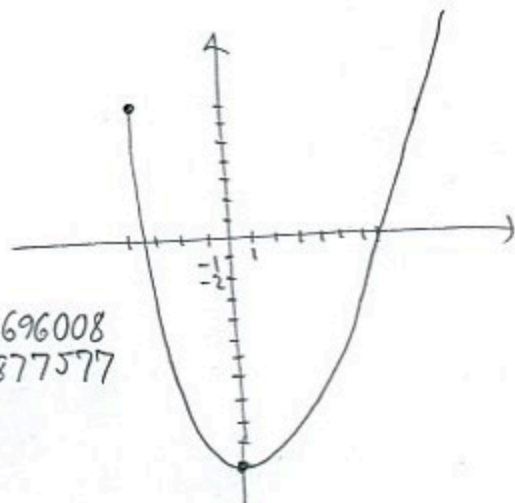b) domain $= [-5, 4)$

c) range $= [-6, -2] \cup (2, 5)$

d) $x = -5, 1$

4. (12pts) The function
$f(x) = (x-9)\sqrt{x+4} + 7$ is given.

a) Use your calculator to accurately its graph. Draw the graph here, and indicate units on the axes.

b) Find all the $x-$ and $y-$intercepts (accuracy: 6 decimal points).

c) State the domain and range.

$$x\text{-}ints, \quad \begin{matrix} -3.696008 \\ 6.877577 \end{matrix}$$

$$y\text{-}int, \ -11$$

c) Domain : $[-4, \infty)$

Range : $[-11.04, \infty)$

5. (12pts) Find the domain of each function and write it using interval notation.

$$f(x) = \frac{\sqrt[5]{3x+24}}{2x-5} \qquad \begin{matrix} odd \sqrt{\text{anything}} \\ \text{is defined} \end{matrix} \qquad\qquad g(x) = \frac{\sqrt{x}}{x^2 + 5x - 24}$$

Can't have :

$2x - 5 = 0$

$2x = 5$

$x = \frac{5}{2}$

$$\left(-\infty, \frac{5}{2}\right) \cup \left(\frac{5}{2}, \infty\right)$$

Can't have   Must have $x \geqslant 0$

$x^2 + 5x - 24 = 0$

$(x+8)(x-3) = 0$ $-8 \quad 0 \quad 3$

$x = -8, 3$
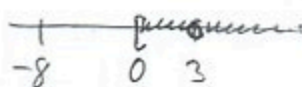
$$[0,3) \cup (3, \infty)$$

6. (12pts) Let $g(x) = \dfrac{2x-7}{x^2 - 3x - 4}$. Find the following (simplify where appropriate).

$$g(-3) = \frac{2(-3) - 7}{(-3)^2 - 3(-3) - 4} = \frac{-13}{9+6-4} = -\frac{13}{11} \qquad g(4) = \frac{2 \cdot 4 - 7}{4^2 - 3 \cdot 4 - 4} = \frac{1}{0} \ \text{not defined}$$

$$g(2u) = \frac{2(2u) - 7}{(2u)^2 - 3 \cdot 2u - 4} = \frac{4u - 7}{4u^2 - 6u - 4} \qquad g(x-3) = \frac{2(x-3) - 7}{(x-3)^2 - 3(x-3) - 4}$$

$$= \frac{2x - 6 - 7}{x^2 - 6x + 9 - 3x + 9 - 4} = \frac{2x - 13}{x^2 - 9x + 14}$$