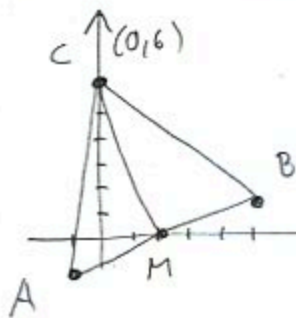


1. (10pts) Let $A = (-1, -1)$, $B = (5, 1)$ and $C = (0, 6)$.
- a) Plot the points in the coordinate system and show algebraically that C has the same distance from A and B .
- b) If M is the midpoint of A and B , outline the triangle AMC and determine algebraically if it is a right triangle.



$$\begin{aligned} a) \quad d(A, C) &= \sqrt{(0 - (-1))^2 + (6 - (-1))^2} = \sqrt{1^2 + 7^2} = \sqrt{50} \\ d(B, C) &= \sqrt{(0 - 5)^2 + (6 - 1)^2} = \sqrt{5^2 + 5^2} = \sqrt{50} \end{aligned} \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \text{same distance} \\ \text{from A and B} \end{array}$$

$$b) \quad M = \left(\frac{-1+5}{2}, \frac{-1+1}{2} \right) = (2, 0)$$

$$d(A, M) = \sqrt{(2 - (-1))^2 + (0 - (-1))^2} = \sqrt{3^2 + 1^2} = \sqrt{10}$$

$$d(M, C) = \sqrt{(0 - 2)^2 + (6 - 0)^2} = \sqrt{2^2 + 6^2} = \sqrt{40}$$

Is triangle AMC right? Check Pythagorean theorem $\sqrt{40}^2 + \sqrt{10}^2 \stackrel{?}{=} \sqrt{50}^2$
 $40 + 10 = 50$ yes
 so it is a right triangle

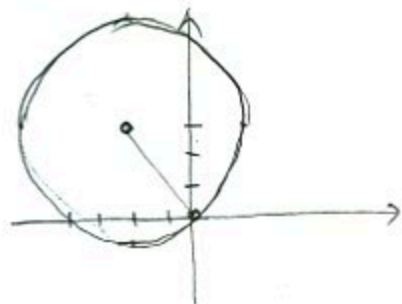
2. (8pts) Write the equation of the circle with center $(-2, 3)$ that passes through the origin. Sketch the circle.

$$r = \text{distance from } (0, 0) \text{ to } (-2, 3) = \sqrt{(-2-0)^2 + (3-0)^2} = \sqrt{(-2)^2 + 3^2} = \sqrt{13}$$

$$(x - (-2))^2 + (y - 3)^2 = \sqrt{13}^2$$

$$(x + 2)^2 + (y - 3)^2 = 13$$

Equation of circle



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

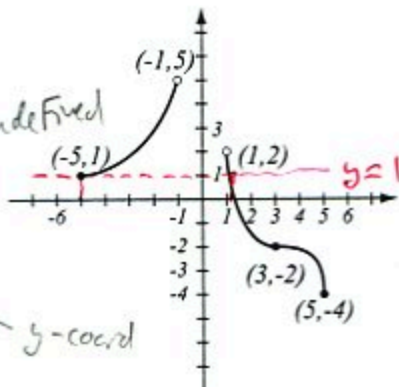
a) Find $f(3)$ and $f(1)$. $f(3) = -2$, $f(1) = \text{undefined}$

b) What is the domain of f ? $[-5, -1) \cup (1, 5]$

c) What is the range of f ? $[-4, 5]$

d) What are the solutions of the equation $f(x) = 1$? $f(x) = 1 \leftarrow y\text{-coord}$

$$x = -5, 1$$

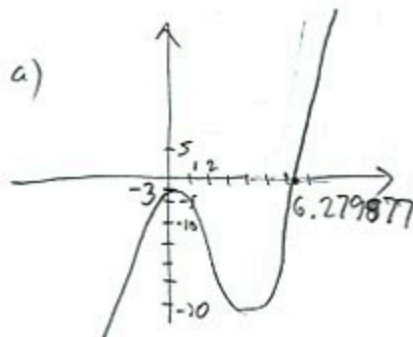


4. (12pts) The function $f(x) = x^3 - 7x^2 + 5x - 3$ is given.

a) Use your calculator to accurately graph the function. 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.



b) x -int: 6.279877
 y -int: $f(0) = -3$

c) From picture, domain = $(-\infty, \infty)$
 range = $(-\infty, \infty)$

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

$$g(x) = \frac{x-7}{x^2+3x-10}$$

Can't have: $x^2+3x-10=0$
 $(x+5)(x-2)=0$
 $x = -5, 2$

~~xxxxxxxxxxxxxxxx~~
 $-5 \quad 2$

$$(-\infty, -5) \cup (-5, 2) \cup (2, \infty)$$

6. (10pts) Let $g(x) = \frac{x^2-5}{x^2+3x-28}$. Find the following (simplify where appropriate).

$$g(4) = \frac{4^2-5}{4^2+3 \cdot 4-28} = \frac{16-5}{16+12-28} = \frac{11}{0} \text{ not defined}$$

$$g(-2) = \frac{(-2)^2-5}{(-2)^2+3 \cdot (-2)-28} = \frac{4-5}{4-6-28} = \frac{-1}{-30} = \frac{1}{30}$$

$$g(\sqrt{u}) = \frac{\sqrt{u}^2-5}{\sqrt{u}^2+3\sqrt{u}-28} = \frac{u-5}{u+3\sqrt{u}-28}$$

$$g(x+3) = \frac{(x+3)^2-5}{(x+3)^2+3(x+3)-28}$$

$$= \frac{x^2+6x+9-5}{x^2+6x+9+3x+9-28} = \frac{x^2+6x+4}{x^2+9x-10}$$