College Algebra — Joysheet 1
MAT 140, Fall 2017 — D. Ivanšić

Name: Saul Ocean

Covers: 1.1, 1.2 *Show all your work!*

1. (8pts) Let $A = (-3, -2)$ and $B = (5, 0)$.
a) Find the midpoint M of A and B.
b) Verify that the distances from M to A and M to B are equal.

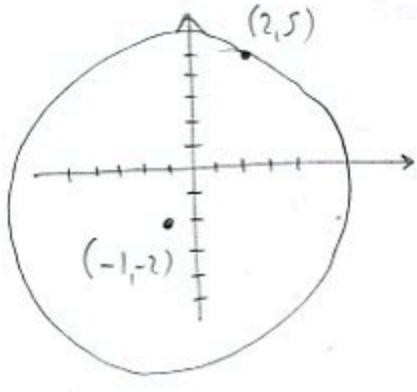
a) $M = \left(\frac{-3+5}{2}, \frac{-2+0}{2}\right) = (1, -1)$

b) $d(M,A) = \sqrt{(-3-1)^2 + (-2-(-1))^2} = \sqrt{16+1} = \sqrt{17}$
$d(M,B) = \sqrt{(5-1)^2 + (0-(-1))^2} = \sqrt{16+1} = \sqrt{17}$
> are equal

2. (10pts) Write the equation of the circle with center $(-1, -2)$ that contains the point $(2, 5)$. Sketch the circle.

radius = distance from $(-1,-2)$ to $(2,5)$
$= \sqrt{(2-(-1))^2 + (5-(-2))^2}$
$= \sqrt{9+49} = \sqrt{58}$

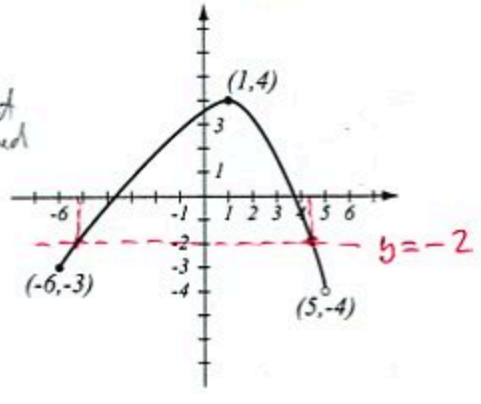
Eq. of Circle: $(x-(-1))^2 + (y-(-1))^2 = \sqrt{58}^2$
$(x+1)^2 + (y+1)^2 = 58$



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

a) Find $f(1)$ and $f(5)$. $f(1) = 4$, $f(5)$ is not defined
b) What is the domain of f? $[-6, 5)$
c) What is the range of f? $(-4, 4]$
d) What are the solutions of the equation $f(x) = -2$?

$x = -5.25, 4.25$

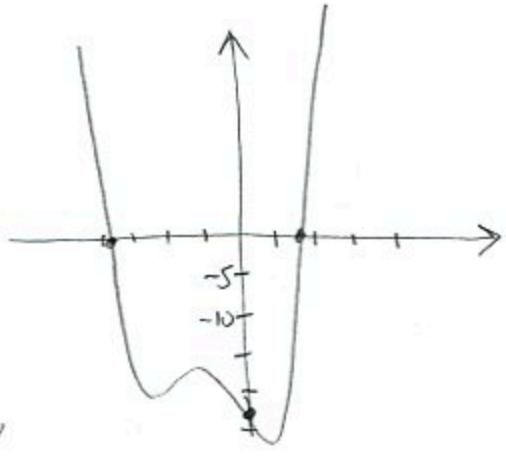


4. (12pts) The function $f(x) = x^4 + 5x^3 + 4x^2 - 7x - 18$ is given.

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.



b) x-int: -3.787114, 1.451578

y-int: $f(0) = -18$

c) Domain = all reals Range = $[-19.84337, \infty)$

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

$$f(x) = \frac{\sqrt[3]{4x-11}}{7x-5}$$

$\sqrt[3]{\text{anything}}$ is defined

Can't have:

$7x - 5 = 0$

$7x = 5$

$x = \frac{5}{7}$

$(-\infty, \frac{5}{7}) \cup (\frac{5}{7}, \infty)$

$$g(x) = \frac{\sqrt{x}}{x^2 - 2x - 15}$$

Can't have:

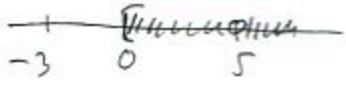
$x^2 - 2x - 15 = 0$

$(x-5)(x+3) = 0$

$x = 5, -3$

Must have:

$x \geq 0$



$[0, 5) \cup (5, \infty)$

6. (10pts) Let $g(x) = \frac{2x-4}{x^2-1}$. Find the following (simplify where appropriate).

$g(3) = \frac{2 \cdot 3 - 4}{3^2 - 1} = \frac{2}{8} = \frac{1}{4}$

$g(1) = \frac{2 \cdot 1 - 4}{1^2 - 1} = \frac{-2}{0}$ not defined

$g(-z) = \frac{2(-z) - 4}{(-z)^2 - 1} = \frac{-2z - 4}{z^2 - 1}$

$g(w+3) = \frac{2(w+3) - 4}{(w+3)^2 - 1} = \frac{2w + 6 - 4}{w^2 + 6w + 9 - 1} = \frac{2w+2}{w^2 + 6w + 8}$