College Algebra — Joysheet 1
MAT 140, Fall 2016 — D. Ivanšić

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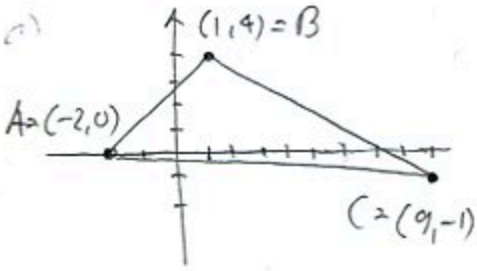
Covers: 1.1, 1.2 *Show all your work!*

1. (10pts) Draw the points $A = (-2, 0)$, $B = (1, 4)$ and $C = (9, -1)$.
a) Which of points A or B is closer to C?
b) Is the triangle ABC is a right triangle?



$d(A,C) = \sqrt{(9-(-2))^2 + (-1-0)^2} = \sqrt{11^2 + (-1)^2} = \sqrt{122}$

$d(B,C) = \sqrt{(9-1)^2 + (-1-4)^2} = \sqrt{8^2 + (-5)^2} = \sqrt{89}$

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

a) Since $\sqrt{122} > \sqrt{89}$,
B is closer to C than A

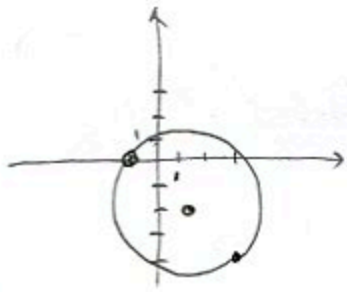
b) Check if
$\sqrt{25}^2 + \sqrt{89}^2 \stackrel{?}{=} \sqrt{122}^2$
$25 + 89 \stackrel{?}{=} 122$
$114 \stackrel{?}{=} 122$ not true,
so triangle is not right,

2. (8pts) Write the equation of the circle whose diameter has endpoints $(3, -4)$ and $(-1, 0)$. Sketch the circle.

Center = midpt of $(3,-4)$ and $(-1,0)$
$= \left(\frac{3+(-1)}{2}, \frac{-4+0}{2}\right) = (1, -2)$

radius = distance from $(1,-2)$ to $(-1,0)$
$= \sqrt{(-1-1)^2 + (0-(-2))^2}$
$= \sqrt{(-2)^2 + 2^2} = \sqrt{8} = 2\sqrt{2}$

Eq: $(x-1)^2 + (y-(-2))^2 = \sqrt{8}^2$
of circle $(x-1)^2 + (y+2)^2 = 8$



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

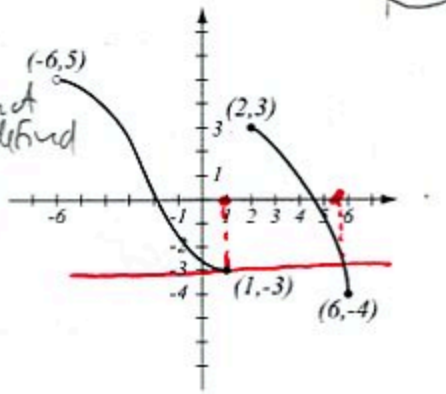
a) Find $f(2)$ and $f(1.5)$. $f(2) = 3$, $f(1.5)$ not defined

b) What is the domain of f? $(-6, 1] \cup [2, 6]$

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

d) What are the solutions of the equation $f(x) = -3$?

$x = 1, 5.5$



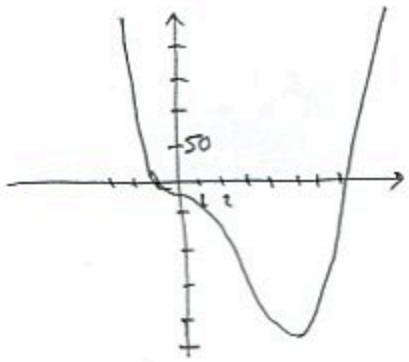
4. (12pts) The function $f(x) = x^4 - 7x^3 + x^2 - x - 5$ is given.

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.

a)



b) y-int: $f(0) = -5$ x-int: -0.775307, 6.891224

c) domain = all real numbers

range = $[-236.3288, \infty)$

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

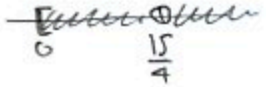
$g(x) = \dfrac{\sqrt{x}}{4x - 15}$

Must have $x \geq 0$

Can't have $4x - 15 = 0$

$4x = 15$

$x = \frac{15}{4}$



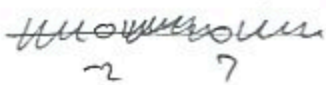
$[0, \frac{15}{4}) \cup (\frac{15}{4}, \infty)$

$f(x) = \dfrac{|2x - 3|}{x^2 - 5x - 14}$

Can't have $x^2 - 5x - 14 = 0$

$(x-7)(x+2) = 0$

$x = 7, -2$



$(-\infty, -2) \cup (-2, 7) \cup (7, \infty)$

6. (10pts) Let $g(x) = \dfrac{x^2 + 2x - 3}{2x - 8}$. Find the following (simplify where appropriate).

$g(1) = \dfrac{1^2 + 2 \cdot 1 - 3}{2 \cdot 1 - 8} = \dfrac{0}{-6} = 0$

$g(4) = \dfrac{4^2 + 2 \cdot 4 - 3}{2 \cdot 4 - 8} = \dfrac{21}{0}$ not defined

$g(-3t) = \dfrac{(-3t)^2 + 2(-3t) - 3}{2(-3t) - 8}$

$= \dfrac{9t^2 - 6t - 3}{-6t - 8}$

$= -\dfrac{9t^2 - 6t - 3}{6t + 8}$

$g(u + 4) = \dfrac{(u+4)^2 + 2(u+4) - 3}{2(u+4) - 8}$

$= \dfrac{u^2 + 2 \cdot u \cdot 4 + 4^2 + 2u + 8 - 3}{2u + 8 - 8}$

$= \dfrac{u^2 + 10u + 21}{2u}$