College Algebra — Joysheet 1
MAT 140, Spring 2018 — D. Ivanšić

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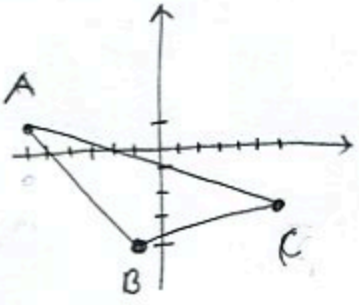
Covers: 1.1, 1.2 *Show all your work!*

1. (8pts) Let $A = (-6, 1)$, $B = (-1, -4)$ and $C = (6, -3)$. Draw the triangle and then determine algebraically if the triangle ABC is
a) a right triangle,
b) an isosceles triangle (two sides have equal length).



$d(A,B) = \sqrt{(-1-(-6))^2+(-4-1)^2} = \sqrt{5^2+(-5)^2} = \sqrt{50}$

$d(B,C) = \sqrt{(6-(-1))^2+(-3-(-4))^2} = \sqrt{7^2+1^2} = \sqrt{50}$

$d(A,C) = \sqrt{(6-(-6))^2+(-3-1)^2} = \sqrt{12^2+(-4)^2} = \sqrt{160}$

a) $\sqrt{50}^2 + \sqrt{50}^2 \stackrel{?}{=} \sqrt{160}^2$

$50 + 50 \stackrel{?}{=} 160$

no, so not a right triangle

b) Sides AB and BC have equal length, so isosceles

2. (10pts) Write the equation of the circle whose diameter has endpoints $(-3, 4)$ and $(1, -2)$. Sketch the circle.

center = midpoint of $(-3,4)$ and $(1,-2)$

$= \left(\frac{-3+1}{2}, \frac{4-2}{2}\right) = \left(-\frac{2}{2}, \frac{2}{2}\right) = (1,-1)$

diameter $= \sqrt{(1-(-3))^2+(-2-4)^2}$

$= \sqrt{4^2+(-6)^2}$

$= \sqrt{52} = 2\sqrt{13}$

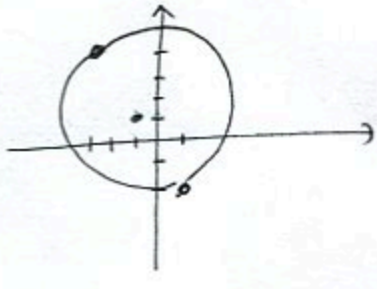
4.13

radius $= \frac{2\sqrt{13}}{2}$

$r = \sqrt{13}$

Eg: $(x-1)^2+(y-(-1))^2 = \sqrt{13}^2$

$(x-1)^2+(y+1)^2 = 13$



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

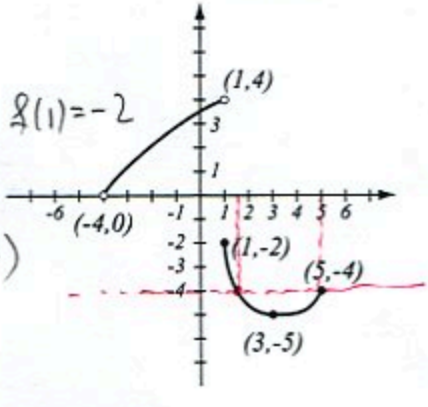
a) Find $f(-4)$ and $f(1)$. $f(-4)$ = not defined, $f(1) = -2$

b) What is the domain of f? $(-4, 5]$

c) What is the range of f? $[-5, -2] \cup (0, 4)$

d) What are the solutions of the equation $f(x) = -4$?

$x = -1.5,\ 5$

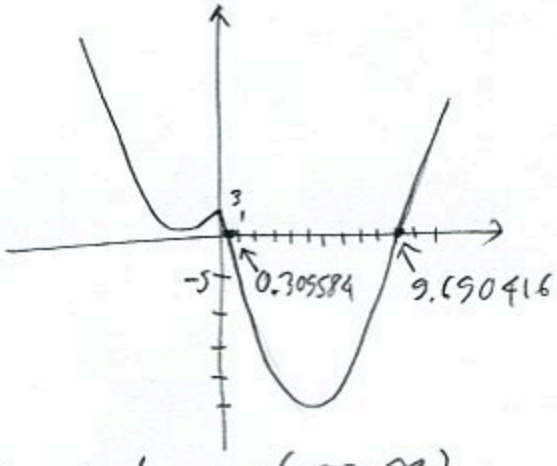


4. (12pts) The function $f(x) = x^2 - 6|x| - 4x + 3$ is given.

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) y-int = $f(0) = 3$

x-int: 0.309584, 9.690416 c) domain $= (-\infty, \infty)$

range $= [-22, \infty)$

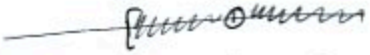
5. (12pts) Find the domain of each function and write it using interval notation.

$$f(x) = \frac{\sqrt{x}}{6x - 11}$$

Must have: $x \geq 0$

Can't have: $6x - 11 = 0$

$x = \frac{11}{6}$



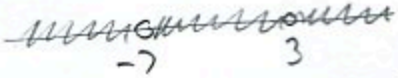
$[0, \frac{11}{6}) \cup (\frac{11}{6}, \infty)$

$$g(x) = \frac{x^2 - 5x - 24}{x^2 + 4x - 21}$$

Can't have: $x^2 + 4x - 21 = 0$

$(x+7)(x-3) = 0$

$x = -7, 3$



$(-\infty, -7) \cup (-7, 3) \cup (3, \infty)$

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

$g(4) = 4^2 + 3 \cdot 4 - \sqrt{4}$

$= 16 + 12 - 2 = 26$

$g(-9) = (-9)^2 + 3(-9) - \sqrt{-9}$

not defined

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

$= t^2 - 3t - \sqrt{-t}$

$g(w-2) = (w-2)^2 + 3(w-2) - \sqrt{w-2}$

$= w^2 - 4w + 4 + 3w - 6 - \sqrt{w-2}$

$= w^2 - w - 2 - \sqrt{w-2}$