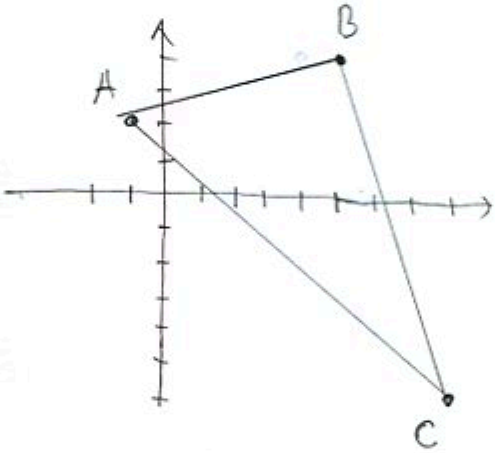
College Algebra — Joysheet 2 **MAT 140, Fall 2020 — D. Ivanšić**	**Name:** Saul Ocean *Covers: 1.1, 1.2* *Show all your work!*

1. (8pts) Let $A=(-1,2)$, $B=(5,4)$ and $C=(8,-6)$. Draw the triangle ABC and then determine algebraically if it is a right triangle.



$d(A,B)=\sqrt{(5-(-1))^2+(4-2)^2}=\sqrt{36+4}=\sqrt{40}=2\sqrt{10}$

$d(B,C)=\sqrt{(8-5)^2+(-6-4)^2}=\sqrt{9+100}=\sqrt{109}$

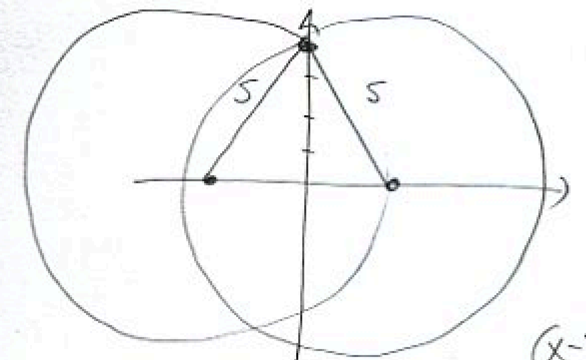
$d(A,C)=\sqrt{(8-(-1))^2+(-6-2)^2}=\sqrt{81+64}=\sqrt{145}$ ← Biggest

$\sqrt{40}^2+\sqrt{109}^2 \overset{?}{=} \sqrt{145}^2$

$40+109 \neq 145$

So it is not a right triangle

2. (10pts) There are two circles that have radius 5, whose center is on the x-axis, and which contain the point $(0,4)$. Find the equations of the two circles, and sketch them.



Center $=(h,0)$ distance from center to $(0,4)$ is 5

$\sqrt{(0-h)^2+(4-0)^2}=5 \quad |^2$

$h^2+16=25$

$h^2=9$

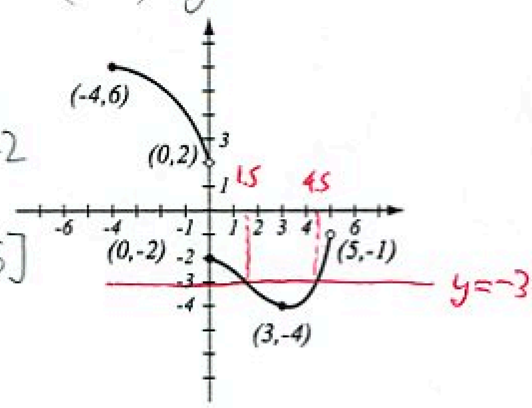
$h=\pm 3$

Possible centers: $(3,0)$, $(-3,0)$

Equations:

$(x-3)^2+y^2=25 \quad (x+3)^2+y^2=25$

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



a) Find $f(3)$ and $f(0)$. $f(3)=-4$, $f(0)=-2$

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

c) What is the range of f? $[-4,-1)\cup(2,6]$

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

$x=1.5,\ 4.5$

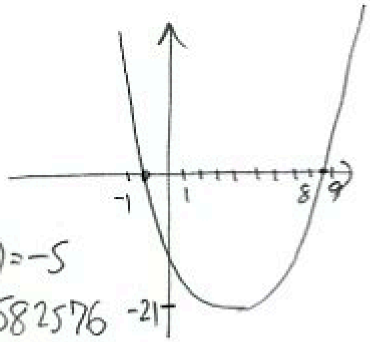
4. (12pts) The function $f(x) = x^2 - 8x - 5$ is given.

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, -0.582576

8.582576

c) domain = all real numbers

range = $[-21, \infty)$

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

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

Must have: $x \geq 0$

Can't have $x^2 + 4x - 5 = 0$

$(x+5)(x-1) = 0$

$x = -5, 1$

Domain = $[0, 1) \cup (1, \infty)$

$$f(x) = \frac{\sqrt[3]{x}}{2x + 3}$$

$\sqrt[3]{x}$ can be found for any x

Can't have: $2x + 3 = 0$

$2x = -3$

$x = -\frac{3}{2}$

$(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, \infty)$

6. (10pts) Let $g(x) = \dfrac{\sqrt{x-4}}{x^2 - 9}$. Find the following (simplify where appropriate).

$g(1) = \dfrac{\sqrt{1-4}}{1^2 - 9} = \dfrac{\sqrt{-3}}{-8}$ not defined

$g(6) = \dfrac{\sqrt{6-4}}{6^2 - 9} = \dfrac{\sqrt{2}}{27}$

$g(-\sqrt{t}) = \dfrac{\sqrt{-\sqrt{t} - 4}}{(-\sqrt{t})^2 - 9} = \dfrac{\sqrt{-\sqrt{t} - 4}}{t - 9}$

$g(x+5) = \dfrac{\sqrt{x+5-4}}{(x+5)^2 - 9} = \dfrac{\sqrt{x+1}}{x^2 + 10x + 25 - 9}$

$= \dfrac{\sqrt{x+1}}{x^2 + 10x + 16}$