College Algebra — Joysheet 3 MAT 140, Spring 2016 — D. Ivanšić

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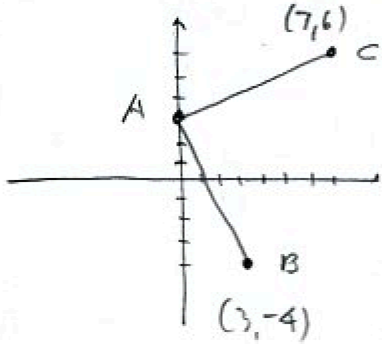
Covers: 1.1, 1.2 *Show all your work!*

1. (10pts) Draw the points $A=(0,3)$, $B=(3,-4)$ and $C=(7,6)$.
a) Which of points B or C is closer to A?
b) Are the lines AB and AC perpendicular? *(Hint: That's the same as asking whether the triangle ABC is a right triangle.)*



a) $d(A,B)=\sqrt{(3-0)^2+(-4-3)^2}=\sqrt{9+49}=\sqrt{58}$

$d(A,C)=\sqrt{(7-0)^2+(6-3)^2}=\sqrt{49+9}=\sqrt{58}$

distances to A from B and C are same,

d) $d(B,C)=\sqrt{(7-3)^2+(6-(-4))^2}=\sqrt{16+100}=\sqrt{116}$

Check Pythagorean theorem:

$\sqrt{58}^2+\sqrt{58}^2\overset{?}{=}\sqrt{116}^2$

yes, since $58+58=116$

2. (8pts) Write the equation of the circle whose diameter has endpoints $(4,-5)$ and $(2,1)$. Sketch the circle.

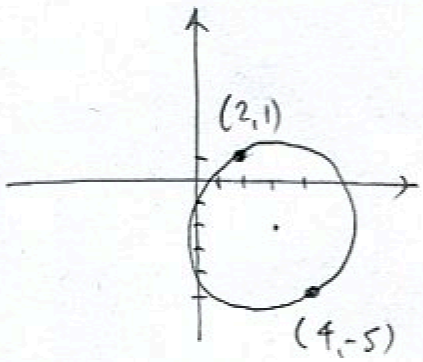
Center $=\left(\frac{4+2}{2},\frac{-5+1}{2}\right)$

$=(3,-2)$

radius = distance from $(3,-2)$ to $(2,1)$

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

$=\sqrt{1+9}=\sqrt{10}$

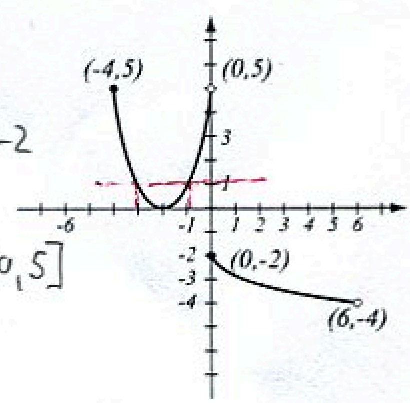


Equation,

$(x-3)^2+(y-(-2))^2=\sqrt{10}^2$

$(x-3)^2+(y+2)^2=10$

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



a) Find $f(-4)$ and $f(0)$. $f(-4)=5$, $f(0)=-2$

b) What is the domain of f? $[-4,6)$

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

d) What are the solutions of the equation $f(x)=1$?

y-coord = 1

$x=-3,-1$

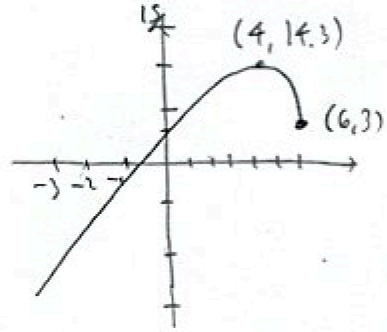
4. (12pts) The function $f(x) = 2x\sqrt{6-x} + 3$ is given.

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)



b) $f(0) = 3$, x-int: -0.584558

c) domain $= (-\infty, 6]$

range $= (-\infty, 14.3]$

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

$$g(x) = \frac{x^2+5}{x^2+6x-16}$$

Can't have

$x^2+6x-16=0$

$(x+8)(x-2)=0$ $\quad -8 \quad 2$

$x=-8, 2$

$(-\infty,-8) \cup (-8,2) \cup (2,\infty)$

$$f(x) = \frac{\sqrt{x}}{3x-2}$$

Must have $x \geq 0$

Can't have $3x-2=0$ $\quad 0 \quad \frac{2}{3}$

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

$[0, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$

6. (10pts) Let $g(x) = \dfrac{\sqrt{3x+15}}{x^2-4}$. Find the following (simplify where appropriate).

$g(7) = \dfrac{\sqrt{3\cdot 7+15}}{7^2-4} = \dfrac{\sqrt{36}}{45} = \dfrac{6}{45} = \dfrac{2}{15}$

$g(-6) = \dfrac{\sqrt{3\cdot(-6)+15}}{(-6)^2-4} = \dfrac{\sqrt{-3}}{32}$ not a real number

$g(2u) = \dfrac{\sqrt{3\cdot(2u)+15}}{(2u)^2-4}$

$= \dfrac{\sqrt{6u+15}}{4u^2-4}$

$g(x+7) = \dfrac{\sqrt{3(x+7)+15}}{(x+7)^2-4}$

$= \dfrac{\sqrt{3x+21+15}}{x^2+14x+49-4} = \dfrac{\sqrt{3x+36}}{x^2+14x+45}$