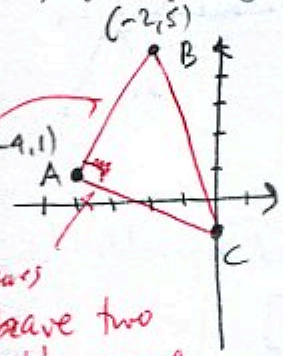
College Algebra — Joysheet 2 MAT 140, Spring 2023 — D. Ivanšić	Name: Saul Ocean *Covers: 1.1, 1.2* *Show all your work!*

1. (11pts) Draw the triangle with vertices $A = (-4, 1)$, $B = (-2, 5)$ and $C = (0, -1)$ in the coordinate plane.
a) Does it look like the triangle is isosceles (has two sides of equal length)?
b) By computing lengths of all sides, find out algebraically whether ABC is isosceles.



appears to have two equal sides

$d(A,B) = \sqrt{(5-1)^2 + (-2-(-4))^2} = \sqrt{4^2+2^2} = \sqrt{20}$

$d(B,C) = \sqrt{(0-(-2))^2 + (-1-5)^2} = \sqrt{(2)^2+(-6)^2} = \sqrt{4+36} = \sqrt{40}$

$d(A,C) = \sqrt{(0-(-4))^2 + (-1-1)^2} = \sqrt{4^2+(-2)^2} = \sqrt{20}$

Sides AB and AC have equal length, so it is an isoscelles triangle

2. (10pts) Find the equation of the circle, if $(-1, -2)$ and $(1, 4)$ are at the ends of a diameter. Draw the circle.

Center is midpoint of $(-1,-2)$ and $(1,4)$

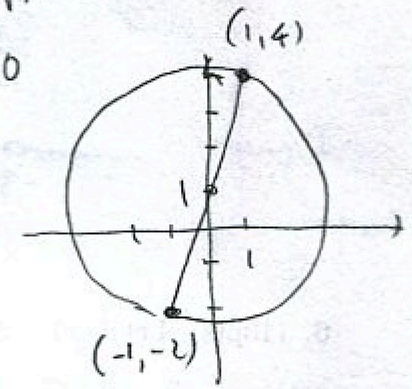
$C = \left(\frac{-1+1}{2}, \frac{-2+4}{2}\right) = (0,1)$

r = distance from center to a point on circle

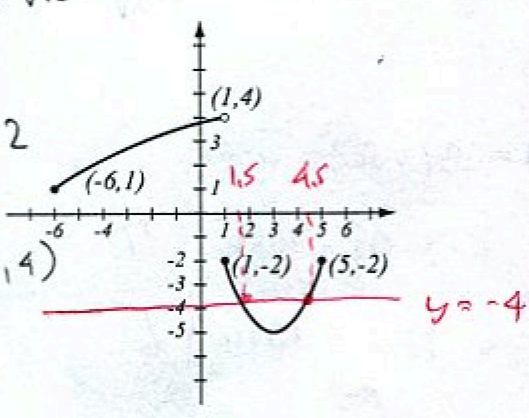
$= \sqrt{(-1-0)^2 + (-2-1)^2} = \sqrt{1+9} = \sqrt{10}$

$(x-0)^2 + (y-1)^2 = \sqrt{10}^2$

$x^2 + (y-1)^2 = 10$



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



a) Find $f(-6)$ and $f(1)$. $f(-6) = 1$, $f(1) = -2$

b) What is the domain of f? $[-6, 5]$

c) What is the range of f? $[-5, -2] \cup [1, 4)$

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

$x = 1.5, 4.5$

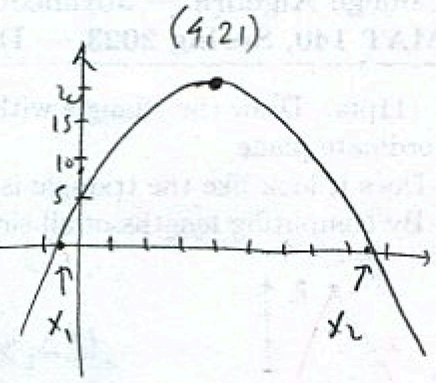
4. (12pts) The function $f(x) = -x^2 + 8x + 5$ is given.

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: $x_1 = -0.582576$

$x_2 = 8.582576$

c) Domain: all real numbers

d) Range: $(-\infty, 21]$

5. (9pts) Find the domain of each function and write it using interval notation.

$f(x) = \dfrac{x-3}{2x+6}$

Can't have: $2x+6=0$

$2x=-6$

$x=-3$

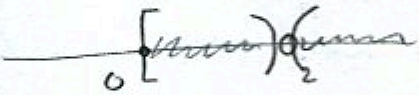
Domain:

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

$g(x) = \dfrac{5+\sqrt{x}}{x-2}$

Must have $x \geq 0$ Can't have: $x-2=0$

$x=2$



$[0,2) \cup (2, \infty)$

6. (10pts) Let $h(x) = 3x^2 - 5x + 7$. Find the following (simplify where appropriate).

$h(1) = 3 \cdot 1^2 - 5 \cdot 1 + 7 = 5$

$h(-3) = 3 \cdot (-3)^2 - 5(-3) + 7$

$= 27 + 15 + 7 = 49$

$h(2\sqrt{u}) = 3(2\sqrt{u})^2 - 5 \cdot 2\sqrt{u} + 7$

$= 3 \cdot 4u - 10\sqrt{u} + 7$

$= 12u - 10\sqrt{u} + 7$

$h(x-3) = 3(x-3)^2 - 5(x-3) + 7$

$= 3(x^2 - 6x + 9) - 5x + 15 + 7$

$= 3x^2 - 18x + 27 - 5x + 22$

$= 3x^2 - 23x + 49$