College Algebra — Joysheet 2
MAT 140, Spring 2026 — D. Ivanšić

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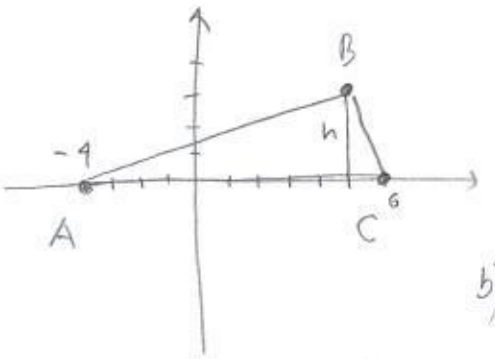
Covers: 1.1, 1.2 *Show all your work!*

1. (11pts) Draw the triangle with vertices $A = (-4, 0)$, $B = (5, 3)$ and $C = (6, 0)$.
a) Compute the lengths of all sides of the triangle.
b) Determine algebraically if the triangle is right.
c) Find the area of the triangle.



$d(A,B) = \sqrt{(5-(-4))^2+(3-0)^2} = \sqrt{9^2+3^2} = \sqrt{81+9} = \sqrt{90} = 3\sqrt{10}$

$d(B,C) = \sqrt{(6-5)^2+(0-3)^2} = \sqrt{1^2+(-3)^2} = \sqrt{1+9} = \sqrt{10}$

$d(A,C) = \sqrt{(6-(-4))^2+(0-0)^2} = \sqrt{10^2+0^2} = \sqrt{10^2} = 10$

b) $\sqrt{90}^2 + \sqrt{10}^2 \stackrel{?}{=} 10^2$ Triangle is a right triangle

$90 + 10 \stackrel{?}{=} 100$ yes

c) $A = \frac{1}{2} b \cdot h = \frac{1}{2} \cdot 10 \cdot 3 = \frac{30}{2} = 15$

2. (10pts) Find the equation of the circle if the endpoints of its diameter are $(-2, 3)$ and $(4, 0)$. Draw the circle.

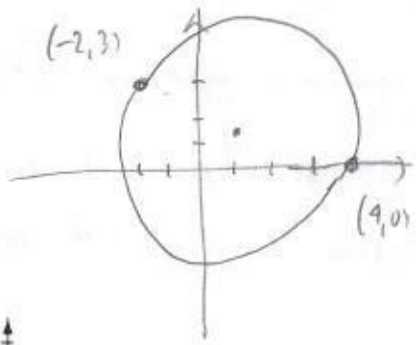
Center = midpt of $(-2,3)$ and $(4,0)$

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

$r = \frac{\text{diameter}}{2} = \frac{\sqrt{(0-3)^2+(-2-4)^2}}{2}$

$= \frac{\sqrt{(-3)^2+(-6)^2}}{2} = \frac{\sqrt{9+36}}{2} = \frac{\sqrt{45}}{2} = \frac{3\sqrt{5}}{2}$

Equation: $(x-1)^2 + \left(y-\frac{3}{2}\right)^2 = \left(\frac{\sqrt{45}}{2}\right)^2 = \frac{45}{4}$



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

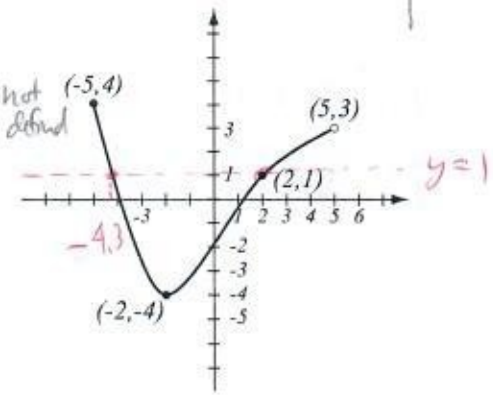
a) Find $f(-2)$ and $f(6)$. $f(-2) = -4$, $f(6)$ not defined

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

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

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

$x = -4.3, 2$

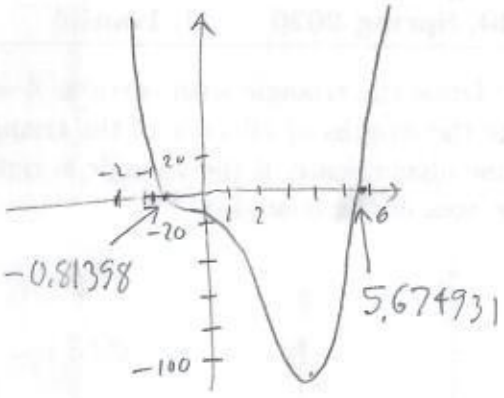


4. (12pts) The function $f(x) = x^4 - 6x^3 + 2x^2 - 5$ is given.

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.



b) y-int: $f(0) = -5$

x-int: -0.81358, 5.674931

c) Domain: $(-\infty, \infty)$

Range: $[-103.2, \infty)$

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

$f(x) = \dfrac{\sqrt{x}}{2x-7}$

Can't have $2x-7=0$

$2x=7$

$x=\frac{7}{2}$

Must have $x \geq 0$

$[0, \frac{7}{2}) \cup (\frac{7}{2}, \infty)$

$g(x) = \dfrac{4}{x^2-8x}$

Can't have $x^2-8x=0$

$x(x-8)=0$

$x=0$ or $x-8=0$

$x=8$

$(-\infty, 0) \cup (0, 8) \cup (8, \infty)$

6. (10pts) Let $f(x) = x^3 - 4x$. Find the following (simplify where appropriate).

$h(4) = 4^3 - 4 \cdot 4 = 64 - 16 = 48$

$h\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^3 - 4 \cdot \frac{1}{2} = \frac{1}{8} - 2 = \frac{1}{8} - \frac{16}{8} = -\frac{15}{8}$

$h(-2t) = (-2t)^3 - 4(-2t)$

$= -8t^3 + 8t$

$h(t+3) = (t+3)^3 - 4(t+3)$

$= (t+3)(t+3)(t+3) - 4t - 12$

$= (t^2+6t+9)(t+3) - 4t - 12$

$= t^3 + 6t^2 + 9t + 3t^2 + 18t + 27 - 4t - 12$

$= t^3 + 9t^2 + 23t + 15$