College Algebra — Joysheet 3
MAT 140, Fall 2015 — D. Ivanšić

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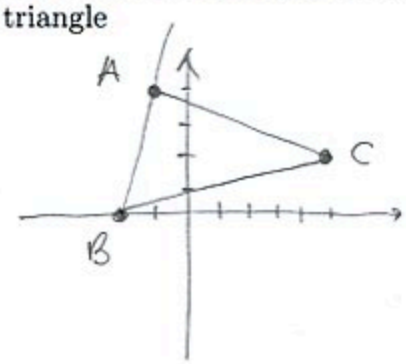
Name: _____

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

1. (8pts) Draw the triangle with vertices $A = (-1, 4)$, $B = (-2, 0)$ and $C = (5, 2)$. Then use the distance formula and the Pythagorean theorem to find out whether the triangle is a right triangle



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

$d(A,B) = \sqrt{(-2-(-1))^2 + (0-4)^2} = \sqrt{(-1)^2+(-4)^2} = \sqrt{17}$

$d(B,C) = \sqrt{(5-(-2))^2 + (2-0)^2} = \sqrt{7^2+4^2} = \sqrt{53}$

$\sqrt{40}^2 + \sqrt{17}^2 \stackrel{?}{=} \sqrt{53}^2$

$40+17 \neq 53$ so not a right triangle

2. (8pts) Write the equation of the circle whose diameter has endpoints $(-3, -2)$ and $(1, 2)$. Sketch the circle.

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

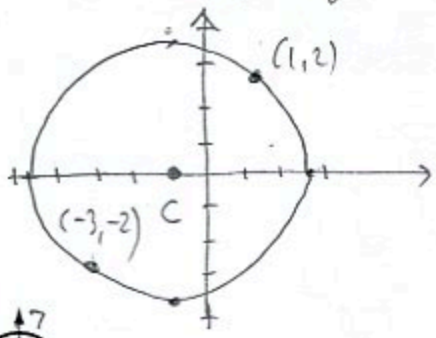
$C = \left(\frac{-3+1}{2}, \frac{-2+2}{0}\right) = (-1, 0)$

radius $= \frac{\text{diameter}}{2} = \frac{\sqrt{(1-(-3))^2 + (2-(-2))^2}}{2}$

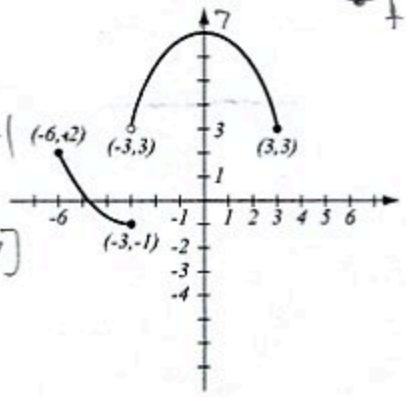
$= \frac{\sqrt{4^2+4^2}}{2} = \frac{\sqrt{32}}{2} = \frac{4\sqrt{2}}{2} = 2\sqrt{2} \approx 2.8$

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

$(x+1)^2 + y^2 = 8$



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



a) Find $f(3)$ and $f(-3)$. $f(3) = 3$, $f(-3) = -1$

b) What is the domain of f? $[-6, 3]$

c) What is the range of f? $[-1, 2] \cup [3, 7]$

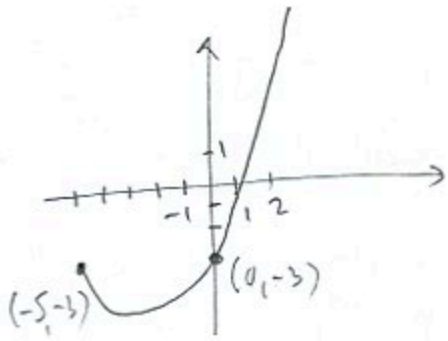
d) What are the solutions of the equation $f(x) = 4$? $f(x) = 4$ for $x = -2.7, 2.7$

4. (12pts) The function $f(x) = x\sqrt{x+5} - 3$ 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.



c) domain $= [-5, \infty)$

range $= [-7.3, \infty)$

b) y-int: $x = 0$, $y = -3$

x-int via calculator: $x = 1.204402$

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

$$f(x) = \frac{\sqrt{x}}{4x - 11}$$

Must have $x \geq 0$

Can't have $4x - 11 = 0$

$4x = 11$

$x = \frac{11}{4}$

0 $\quad$ 11/4

domain $[0, \frac{3}{4}) \cup (\frac{3}{4}, \infty)$

$$g(x) = \frac{3x + 7}{x^2 - 3x - 10}$$

Can't have $x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$x = 5, -2$

-2 $\quad$ 5

Domain $= (-\infty, -2) \cup (-2, 5) \cup (5, \infty)$

6. (12pts) Let $g(x) = \dfrac{x^2 + 3x - 1}{4x - 2}$. Find the following (simplify where appropriate).

$g(-1) = \dfrac{(-1)^2 + 3(-1) - 1}{4(-1) - 2} = \dfrac{1 - 3 - 1}{-4 - 2} = \dfrac{-3}{-6} = \dfrac{1}{2}$

$g\left(\frac{1}{2}\right) = \dfrac{\left(\frac{1}{2}\right)^2 + 3 \cdot \frac{1}{2} - 1}{4 \cdot \frac{1}{2} - 2}$ not defined

0 in denom

$g(3u) = \dfrac{(3u)^2 + 3 \cdot 3u - 1}{4(3u) - 2}$

$= \dfrac{9u^2 + 9u - 1}{12u - 2}$

$g(x+4)$

$= \dfrac{(x+4)^2 + 3(x+4) - 1}{4(x+4) - 2} = \dfrac{x^2 + 8x + 16 + 3x + 12 - 1}{4x + 16 - 2}$

$= \dfrac{x^2 + 11x + 27}{4x + 14}$ ← can't factor