

1. (8pts) Let $A = (-1, 3)$ and $B = (7, -3)$.
 a) Find the midpoint M of A and B .
 b) Verify that the distances from M to A and M to B are equal.

$$M = \left(\frac{-1+7}{2}, \frac{3+(-3)}{2} \right) = (3, 0)$$

$$\left. \begin{aligned} d(A, M) &= \sqrt{(3-(-1))^2 + (0-3)^2} = \sqrt{16+9} = \sqrt{25} = 5 \\ d(B, M) &= \sqrt{(7-3)^2 + (-3-0)^2} = \sqrt{16+9} = \sqrt{25} = 5 \end{aligned} \right\} \begin{array}{l} \text{these distances} \\ \text{are equal} \end{array}$$

2. (10pts) Write the equation of the circle with center $(-3, -4)$ that contains the point $(2, 1)$. Sketch the circle.

$$r = \text{distance from } (-3, -4) \text{ to } (2, 1)$$

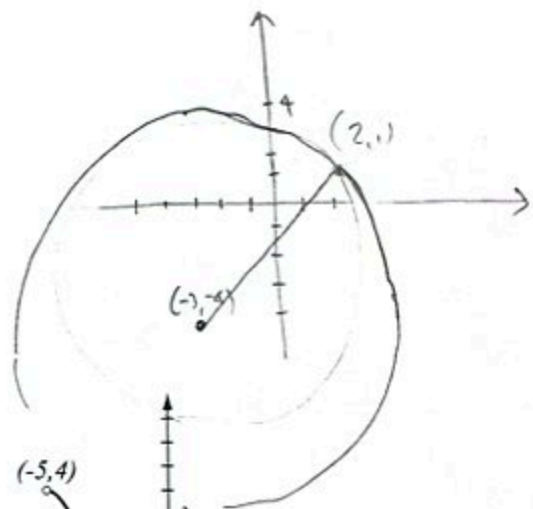
$$= \sqrt{(2-(-3))^2 + (1-(-4))^2}$$

$$= \sqrt{25 + 25} = \sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2}$$

Eg. of
Circle!

$$(x-(-3))^2 + (y-(-4))^2 = (5\sqrt{2})^2$$

$$\boxed{(x+3)^2 + (y+4)^2 = 50}$$



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

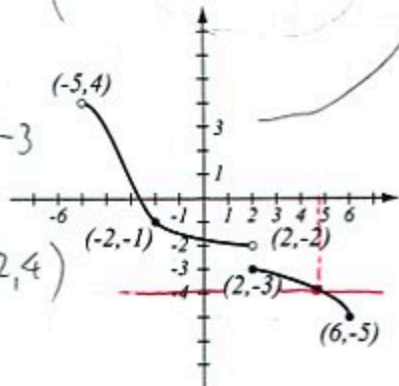
a) Find $f(-2)$ and $f(2)$. $f(-2) = -1$ $f(2) = -3$

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

c) What is the range of f ? $[-5, -3] \cup (-2, 4)$

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

$$x = 4.7$$

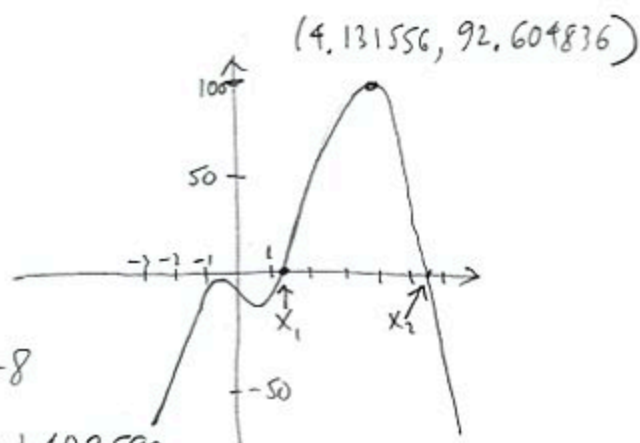


4. (12pts) The function $f(x) = -x^4 + 5x^3 + 4x^2 - 7x - 8$ is given.

a) Use your calculator to accurately graph the function. 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.



y -int: -8

x -int: $x_1 = 1.403599$

$x_2 = 5.448878$

Domain = all real numbers

Range = $(-\infty, 92.604836)$

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

$$f(x) = \frac{\sqrt[3]{3x-17}}{2x-5}$$

$$g(x) = \frac{\sqrt{x}}{x^2 - 5x - 24}$$

$\sqrt[3]{3x-17}$ exists for all x

Can't have: $2x-5=0$

$$2x=5$$

$$x = \frac{5}{2}$$

~~Handwritten scribbles~~

$$(-\infty, \frac{5}{2}) \cup (\frac{5}{2}, \infty)$$

Can't have:

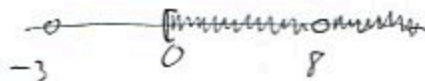
$$x^2 - 5x - 24 = 0$$

$$(x-8)(x+3) = 0$$

$$x = 8, -3$$

Must have:

$$x \geq 0$$



Domain: $[0, 8) \cup (8, \infty)$

6. (10pts) Let $g(x) = \frac{3x+5}{x^2-9}$. Find the following (simplify where appropriate).

$$g(3) = \frac{3 \cdot 3 + 5}{3^2 - 9} = \frac{14}{0} \text{ not defined}$$

$$g(1) = \frac{3 \cdot 1 + 5}{1^2 - 9} = \frac{8}{-8} = -1$$

$$g(-z) = \frac{3(-z) + 5}{(-z)^2 - 9} = \frac{-3z + 5}{z^2 - 9}$$

$$g(w+3) = \frac{3(w+3) + 5}{(w+3)^2 - 9} = \frac{3w + 9 + 5}{w^2 + 6w + 9 - 9}$$

$$= \frac{3w + 14}{w^2 + 6w}$$