# TMath 120

NAME:

Show all your work. You are welcome to use a calculator but no notes, books, internet resources (Desmos is the exception!) or peers can be used. Reasonable supporting work must be shown to earn credit.

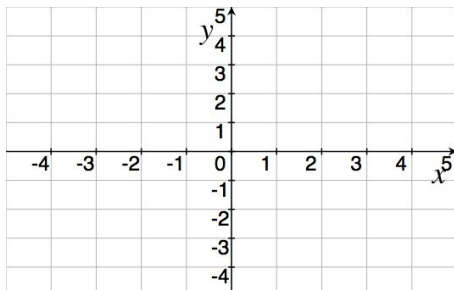1. [2] Create a function whose range consists of colors.

    (a) [1] Identify if/what input returns the color blue.

2. Provide a graph AND an algebraic rule/expression for each of the functions described:

    (a) [3] A polynomial with $f(x) \to -\infty$ as $x \to \infty$ and $f(x) \to \infty$ as $x \to -\infty$.
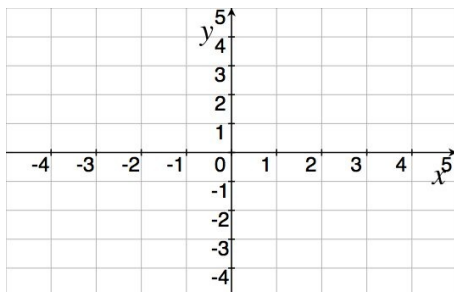
    (b) [3] A line perpendicular to $y = \frac{1}{3}x - 2$.

3. Let f be the piece-wise defined graph comprised a line and a parabola shown below.

(a) Estimate the following *if* possible:

   i. [1] Is $(-3, 1)$ on the graph of f?

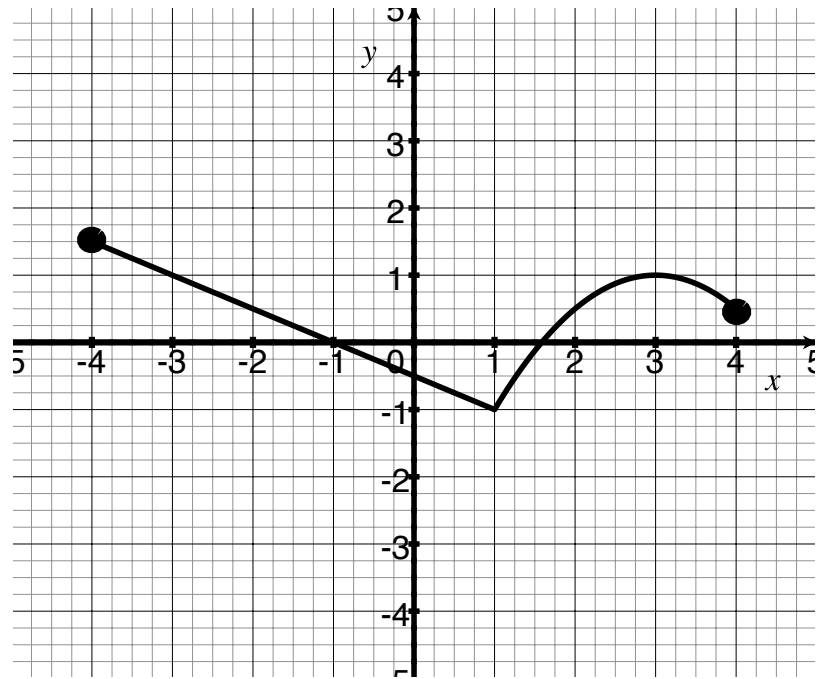   ii. [2] Is f a function? Why or why not?

   iii. [1] $f(2)$

   iv. [1] $(f - f)(2)$

   v. [2] $(f \circ f)(1)$

   vi. [1] the y-intercept of f
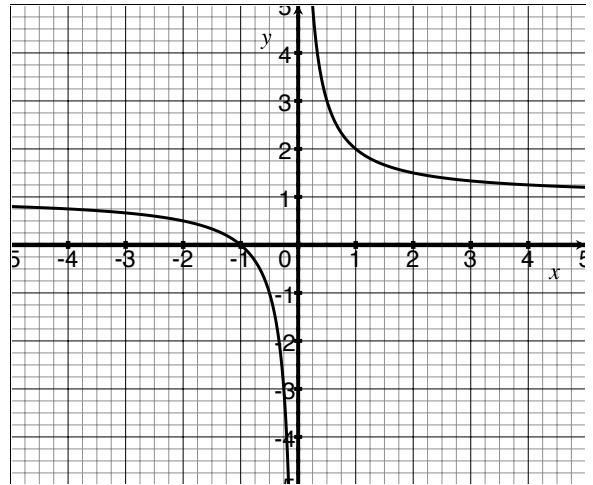
   vii. [1] all possible x such that $f(x) = -1$.

(b) [4] Find the formula for f in the indicated form:

$$f(x) = \begin{cases} & \text{if } -4 \le x \le 1 \\ & \text{if } 1 < x \le 4 \end{cases}$$

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4. Let $\alpha(x) = \dfrac{1}{x} + 1$. The graph of α is shown below.

(a) [2] Find $\alpha(x+h) - \alpha(x)$ and simplify.

(b) [2] Find the algebraic rule/expression for $\alpha^{-1}(x)$.

(c) [2] Write the graph transformations to transform $\alpha(x)$ into $\beta = 2\alpha(x) - 1$.

(d) [2] Sketch a graph of $\beta = 2\alpha(x) - 1$.

5. [3] The area of a rectangle is $3x^4 - 6x^3 + 14x^2 - 4x + 8$ square centimeters. The width is $x^2 - 2x + 4$ cm. Find its length (as a function of x!).

6. [2] Explain how to multiply two complex numbers of the form $a + bi$ and $c + di$.

7. Tony Stark (Iron Man) is in this TMath 120 course. After seven weeks, Tony is getting a bit curious about his grade since he knows Dr. Vanderpool hasn't figured out how to get Canvas "computed" grades to make any sense. He has looked at the gradebook on Canvas and has computed the averages listed below. In case you don't remember, the weights specified in the syllabus and the graph of the function f that takes your class percentage p and returns your final course score on a 4. scale are also provided.

	weight	Tony's ave
Final	25%	
2 Exams	20%	100%
Quizzes	15%	100%
Participation	10%	0%
WebHW	15%	50%
WrittenHW	15%	30%

$$f(p) = \begin{cases} 4.0 & 90 < p \\ .1p - 5 & 57 \le p \le 90 \\ 0.0 & p < 57 \end{cases}$$

(a) [3] Write a function whose input is Tony's final exam percentage and returns his course percentage marks. Be sure to clearly define your variables!!!

(b) [2] Determine what Tony has to get on his final in order to earn a 2.0 in the class, if that is still possibl.e