

NAME:

1. [5] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

T   F    $\frac{1}{b+1} + \frac{1}{b} = \frac{3}{b+1}$

T   F    $-2(x+1)^2 - 7 = f(x)$  is a polynomial

T   F    $-2(x+1)^2 - 7 = f(x)$  has a root at  $x = -1$

T   F    $-2(x+1)^2(x-3)$  is a third degree polynomial.

T   F    $i^3 = -i$

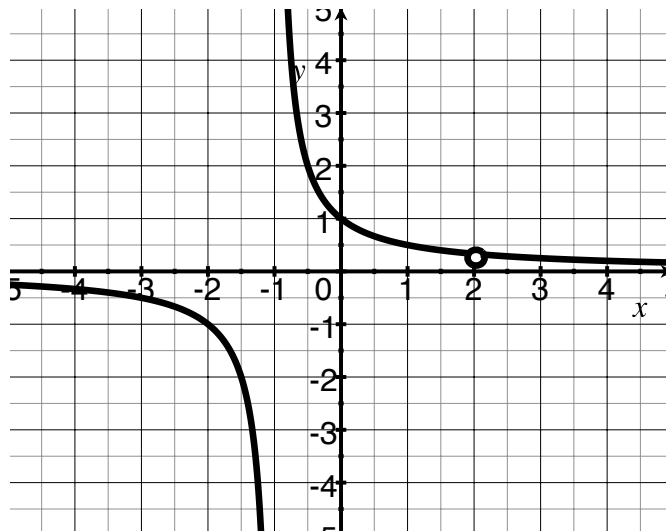
Show all your work. Reasonable supporting work must be shown to earn credit.

2. [3] (WebHW6 #3) Compute:  $(8 + 8i)(3 - i)$

3. [3] (Exam1 #3) Perform and simplify  $\frac{x-2}{\frac{x}{3}} + \frac{x}{5}$

4. [3] (§A.8 #52) Current ( $I$ ), voltage ( $V$ ), and impedance ( $Z$ ) are often represented with complex numbers and relate to each other by  $Z = \frac{V}{I}$ . Given that  $V = 35 + 70i$  and  $I = 7 + 5i$ , find  $Z$ .

5. Let  $f$  be defined by the graph below.



(a) [2] (RationalActivity #2) Is  $f$  a function? Why or why not?

(b) [2] (WebHW6 #11) Is  $f$  a polynomial? Why or why not?

(c) [2] (RationalActivity #2) Estimate the domain of  $f$ .

(d) [1] (WebHW8 #7) Complete the following statement: as  $x \rightarrow \infty$ ,  $y \rightarrow$

(e) [1] (RationalActivity) Identify any vertical asymptotes.

(f) [1] Estimate  $f(-2)$

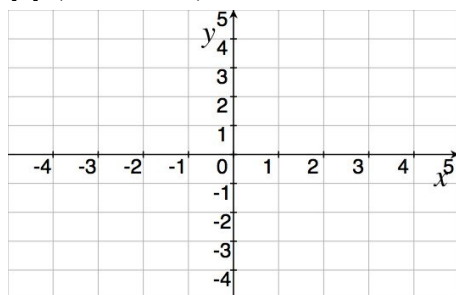
(g) [1] Estimate all possible  $x$  such that  $f(x) = 1$ .

(h) [4] (WebHW8 #9) Find the formula for  $f$ .

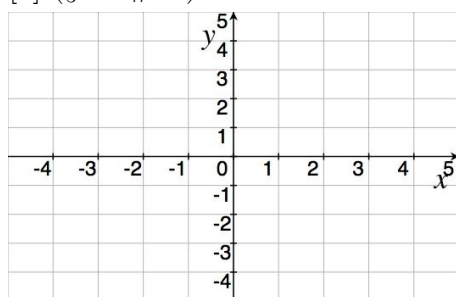
(i) [3] (EndPolynomialActivity #8) Sketch a graph of  $-f(x) - 1$ .

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

- (a) [3] (Quiz2 #3) A cubic polynomial whose *only* roots are  $-2$  and  $3$ .



- (b) [3] (§2.4 #27) A function with a vertical asymptote at  $x = 4$ .



7. The area of a rectangle is  $3x^4 - 6x^3 + 17x^2 - 10x + 20\text{cm}^2$ .

- (a) [2] (§2.2 #38) Describe the end behavior of the function that returns the area of the rectangle given an  $x$ .

- (b) [1] (Quiz2 #2) If  $x = 1$ , find the area of the rectangle.

- (c) [4] (WebHW7 #14) Find the rectangle's width (as a function of  $x$ !) if the length is  $x^2 - 2x + 4$  cm.

8. Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.

No, doing both questions will not earn you extra credit.

- (a) (Exam2 Aut2016 #9) When Pokemon-Go users begin the game they are given 25 Poke balls to use to catch pokemon. To get more Pokeballs, the user must walk or travel. On average one can earn a Poke ball every 0.5 miles.
- i. [4] Find a function describing the average number of miles a user will travel for a Pokeball. Be sure to clearly define any variables you create!
  - ii. [2] Find and justify the domain for your answer above.
- (b) (WordProblems2 #8) It takes about \$28.50 of materials to produce a shoe. The designing fees for a shoe run about \$20,000. The first 5000 shoes are given to stores for displays and celebrities to wear.
- i. [4] Write a function  $f$  describing the average cost of a shoe. Be sure to clearly define any variables you create!
  - ii. [2] How many shoes need to be made to bring the average cost of a shoe under \$40?