

NAME:

1. [6] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let  $f$  be a function, and  $x$ ,  $y$ , and  $z$  be real numbers with  $z \neq 0$ .

T F  $x$  is a polynomial.

T F  $2^x - 5x^2$  is a polynomial.

T F  $\frac{x}{3x^{-2} + 4\sqrt{x}}$  is a rational function.

T F  $(x - 2)$  is a factor of  $y = 2x^3 - 4x - 8$ .

T F Let  $f$  have an inverse, then  $(f(f^{-1}))(130) = 130$ .

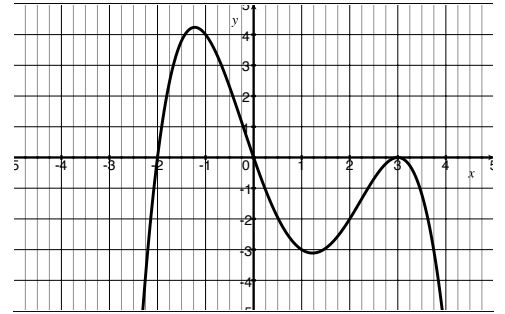
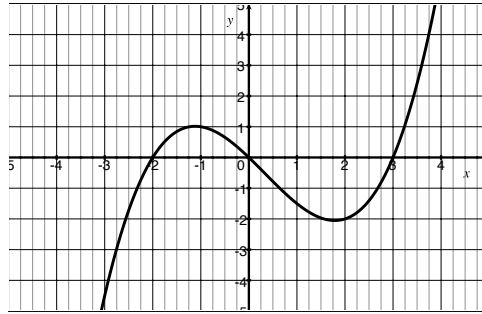
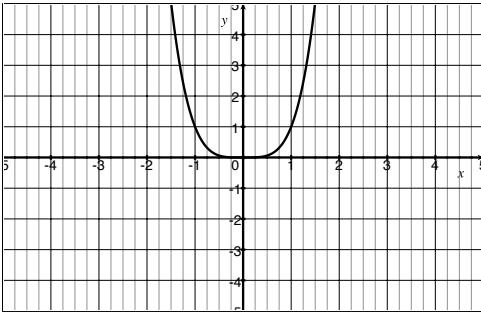
T F  $\frac{1}{a} + \frac{1}{b} = \frac{2}{a+b}$

Show your work for the following problems. The correct answer with no supporting work will receive NO credit (this includes multiple choice questions).

2. [4] (§1.7 #56) Solve for  $y$ ,

$$4x = \frac{y+2}{3y+1}$$

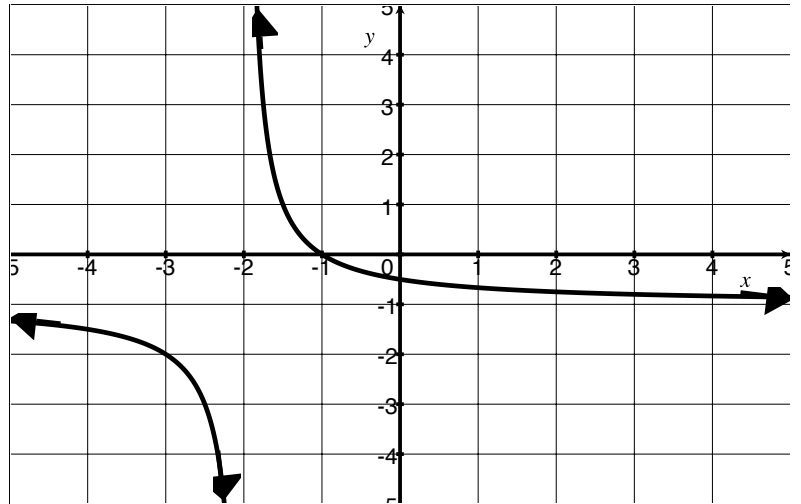
3. [3] (WebHW12 #4) Identify all of the graphs below that could be a 4th degree polynomial.



4. Let  $q$  be the function graphed below:

- (a) [2] (WebHW14 #11)  
Find the range of  $q$

- (b) [2] (WebHW11 #7)  
Could  $q$  be the graph  
of a polynomial?  
Why or why not?



- (c) [2] (InverseWks #3) Note,  $q$  has an inverse. Identify a point on the graph of  $q^{-1}$

- (d) [2] (WebHW14 #6) Describe the graph transformations needed to transform  $p(x) = \frac{1}{x}$  into the graph of  $q$ .

- (e) [2] Find the algebraic rule for  $q$ .

5. [3] (Quiz3 #2) Write a polynomial  $p$  that satisfies the following criteria:

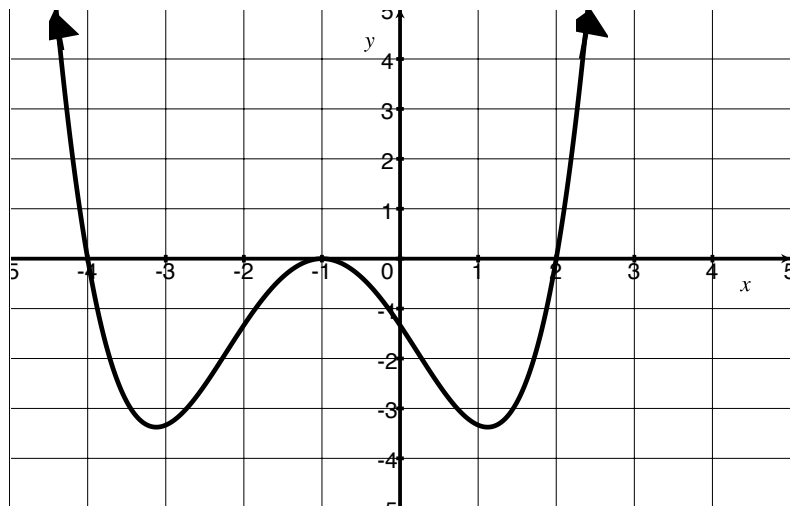
- as  $x \rightarrow \infty$ , then  $y \rightarrow -\infty$
- $-2$ ,  $1$ , and  $3$  are the only roots.

Note: there is more than one right answer!

6. [4] (§1.7 # 56) The function  $g(x) = \frac{2}{x-5} - 1$  is one-to-one (i.e. has an inverse).  
Find  $g^{-1}$ .

7. Let  $p$  be the polynomial graphed below.

- (a) [1] True or False  
The polynomial  $p$   
has odd degree.



- (b) [4] (§2.3 #40) Assume  
when  $p$  is completely  
factored, each real zero  
corresponds to a factor  
of the form  $(x - c)^m$ .

Find the equation of least degree for  $p$ .

8. (Quiz3 #3) [5] The area of a rectangle is  $5x^4 - 15x^3 + 22x^2 - 6x + 8$  cm<sup>2</sup>. Its length is also a function of  $x$  and is  $x^2 - 3x + 4$  cm. If the length is 2, what are the possible widths of the rectangle?
9. [5] 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) (ModelingWks #2) When Pokemon-Go users begin the game they are given 25 Poke balls to use to catch pokemon. To get more Poke balls, the user must walk or travel. On average one can earn a Poke ball every 0.7 miles.
- [3] Find a function describing the average number of miles a user will travel for a Poke ball.
  - [2] Find and explain the meaning of any vertical asymptotes.
- (b) (WordProblems2 #3) The daily pokemon population varies directly with the square root of the population of people (measured in thousands) in the area and inversely with the difference between the current time and noon. At 10am in a location with 64 thousand people we can find 5 pokemon.
- [3] Find a function describing the pokemon population as a function of people and time since noon.
  - [2] Find and explain the meaning of any vertical asymptotes.