Exam 2 **TMath 115** Autumn 2015

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 with an inverse defined.

   T F $\dfrac{\frac{1}{2}+\frac{1}{3}}{a} = \dfrac{5}{6a}$

   T F The graph of $\frac{1}{x-2} = y$ has a vertical asymptote at $x = 2$.

   T F $(x+2)^2 = x^2 + 4$

   T F $(x+1)$ is a factor of $x^4 - 3x^2 + 2$.

   T F $(f \circ f^{-1})(55) = 55$

   T F All functions have inverses.

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

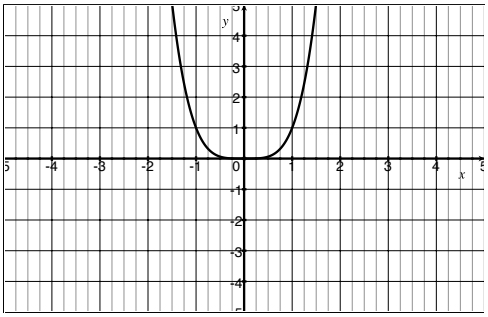
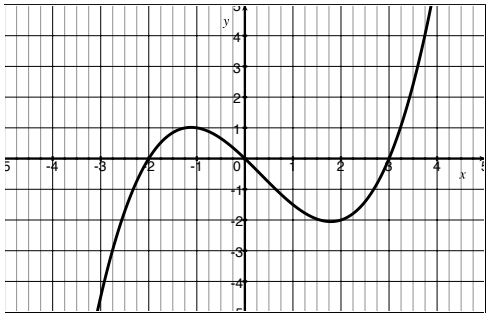
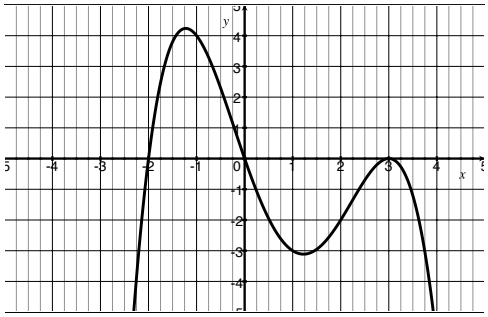
2. Let $q(x) = -2x^2 + 12x - 25$.

   (a) [3] (PracticeExam #6) Write q in vertex or standard form.

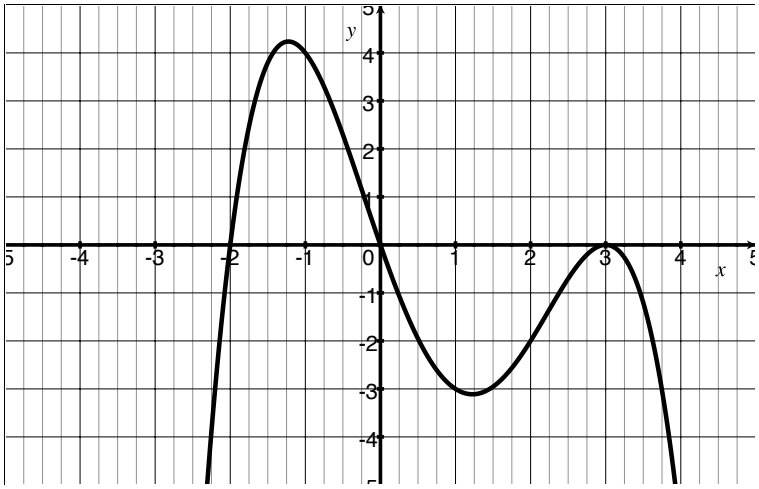
   (b) [2] (WebHW8 #4) Identify if the vertex is a minimum or a maximum and justify your answer.

3. [2] (WebHW10 #3) Write a polynomial of degree five that has five distinct x-intercepts and whose graph rises to the left and falls to the right.

4. [2] (Quiz3 #2) Identify all of the graphs below that could be a 4th degree polynomial.

5. Let p be the function graphed below.



   (a) [1] (PracticeExam #3)
   Find the range of p.

   (b) [1] (PraticeExam #3)
   True or False
   The function p has an inverse.

   (c) [1] (Quiz3 #4) True or False
   The leading coefficient of p is negative.

   (d) [4] (§2.3 #38) 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.

6. Let $f(x) = \dfrac{x+1}{x-2}$

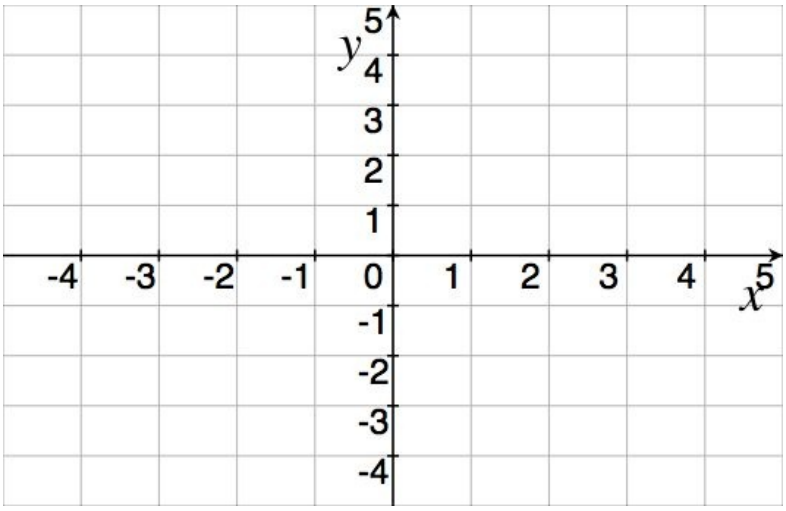
   (a) [3] (WebHW11 #4) Find the quotient and remainder and consider writing your answer as Quotient + Remainder/$(x-2)$

   (b) [1] (RationalWks #2)
   Find the domain of f

   (c) [4] (§1.7 #55) Find the inverse of f

7. Consider $g(x) = 1 + \dfrac{3}{x-2}$

   (a) [4] (RationalWks #4)
   Graph g.
   (Consider using graph transformations of $y = \frac{1}{x}$!)



   (b) [1] (WebHW12 #5)
   Find any vertical asymptotes.

8. [3] (§2.3 #65) The area of a rectangle is $(2x^4 - 2x^3 + 5x^2 - x + 2)$ square centimeters. Its length is $(x^2 - x + 2)$ cm. Find its width.

9. [2] (ModelingWks #1) Alisha went to Europe last summer. She discovered that when she exchanged her U.S. dollars for euros, she received 25% fewer euros than the number of dollars she exchanged. When she returned to the United States, she got 25% more dollars than the number of euros she exchanged.
   Are the two conversion functions inverses? Justify your reasoning.

10. (WebHW8 #6) A rancher with 180 meters of fencing intends to enclose a rectangular region along a river (which serves as a natural boundary requiring no fence).

    (a) [3] Find the area of the region as a function of the width.

    (b) [2] Find the maximum area that can be enclosed.