Exam 1 **TMath 115** Spring 2016

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 $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{2}{a+b}$

   T F $y = x^{\frac{1}{2}} + 5x - 5$ is a polynomial.

   T F If $y = -2x^4 - 56x^3 + 70x^2 - 81$, when $x \to \infty$, then $y \to \infty$.

   T F The function $y = \frac{(x-2)^2}{x-2}$ has an asymptote at $x = 2$.

   T F The function $y = \frac{(x-2)^2}{x-2}$ equals $y = x - 2$ except at $x = 2$

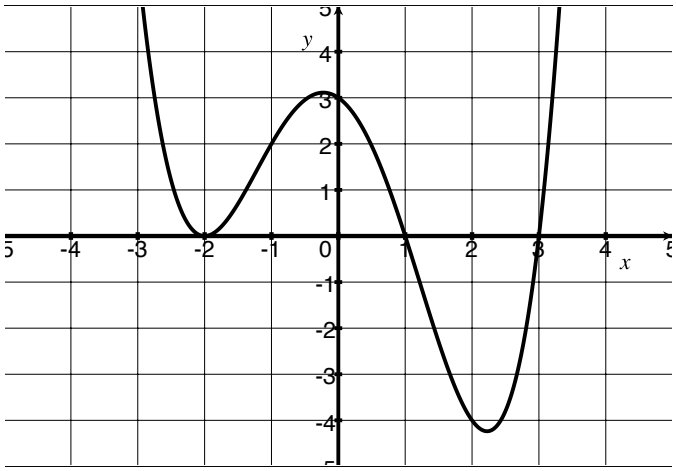
   T F If $f(2) = 3$, then $f^{-1}(3) = 2$.

   T F In this class a 70% corresponds to earning a 2.0.

   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] (WebHW17 #8) Simplify $\left(\dfrac{-6x^5z}{y^3}\right)^3 \left(\dfrac{x^2}{z}\right)$

3. Let α be the graph shown on the right



(a) [1] Is α a function?

(b) [1] (Review §1.6 #55) Estimate $\alpha(0)$.

(c) [2] (InverseWks #3) Does α have an inverse function? Why or why not?

(d) [2] (Quiz3 #3) Could α be a degree three polynomial? Why or why not?

(e) [4] (Polynomial2Wks #2) Find the rule for α

(f) [3] (Review §1.5 #51) Graph $\frac{1}{2}\alpha(x) - 1$ on the right axis above.

4. Let $f(x) = \dfrac{3x+7}{x+2}$

   (a) [3] (WebHW13 #4) Find the quotient and remainder when performing the division. Check your work by verifying that (Quotient)(Divisor)+Remainder=Dividend

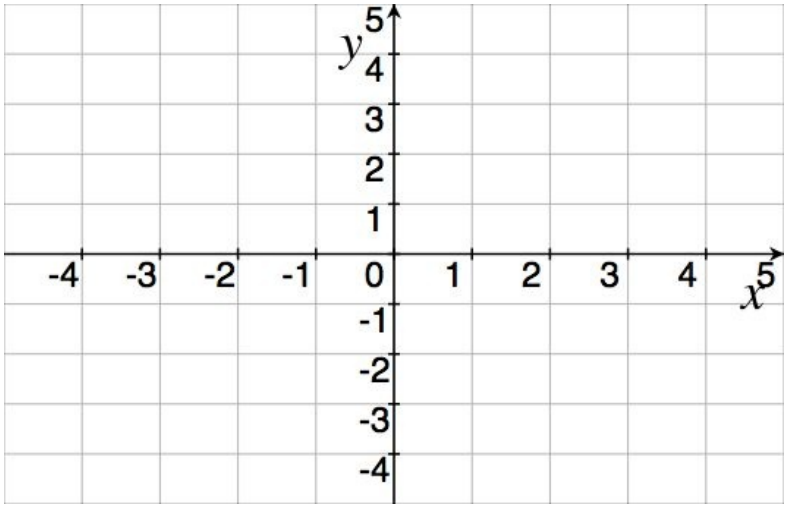
   (b) [1] (§2.5 #40) Identify any vertical asymptotes.

   (c) [4] (WebHW16 #9) Given that f is one-to-one or that f has an inverse, find $f^{-1}(x)$.

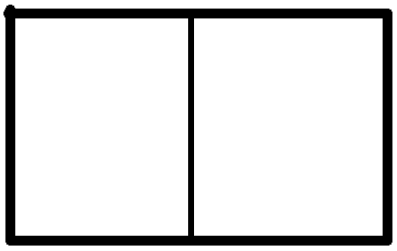
5. Consider the function $g(x) = \frac{1}{x+2} + 3$

   (a) [1] Find the domain of g.

   (b) [3] (Rational Wks #3) Graph g.



6. [5] (pg 195 #77) A farmer wants to construct a fence around a total of 500 square feet in the following configuration where each pen contains 250 square feet. The outer boundary of the pens require a heavy fencing material that costs \$4.5 per foot and the internal partitions cost \$2 per foot. Find a function that describes the total cost of the fence in terms of only one variable.



7. [5] (Presenations #2) You have \$5500 in a retirement fund and would like a return of 5.5% (to do slightly better than the historical trends of inflation). There are 5 year CDs (certificate of deposits) being offered with an annual rate of 2.15% and index funds (a collection of stocks from companies included in measures like the S&P 500) that returned 8.2% since the 1990's (Thomson Reuters, 2010 S&P 500 Composite Index total return for the period 12/31/1989 to 12/31/2009). How much money do you relegate to a CD and how much money do you put in an index fund to get an annual return of 5.5% for the next five years?