Exam 1 # TMath 120 Summer 2015

NAME:

1. 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 $\frac{\frac{1}{2}}{a} + \frac{1}{2a} = a$

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

   T F $f(x-1) = f(x) - 1$

   T F $(2+3i)(1-i) = 2*1 + 3*(-1)i = 2 - 3i$

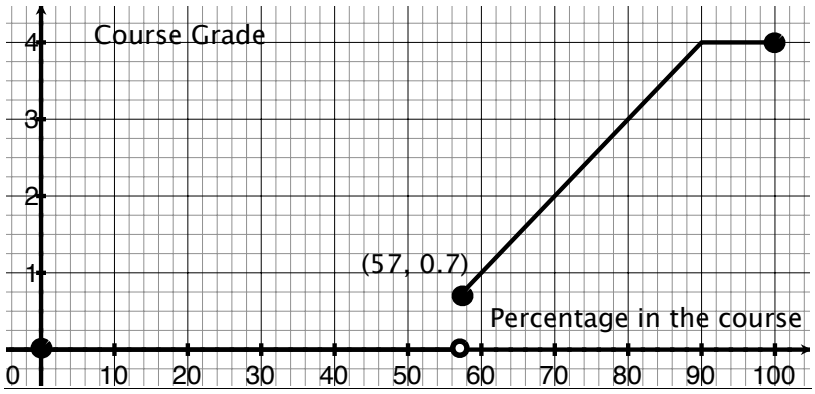
   T F A fourth degree polynomial always has four complex roots.

   T F If f has an inverse and $f(1) = -2$ then $f^{-1}(-2) = 1$

   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] (Practice Exam #3) Find any real or imaginary x such that $\dfrac{2x}{2x-2} - \dfrac{x+1}{2x-2} = \dfrac{1}{2x}$.

3. Let f be the function comprised of three line segments whose graph is below:



(a) [4] (Quiz1 #2) Estimate the following *if* possible:

i. $f(85)$

ii. $6f(70) + 3$

iii. $(f \circ f)(90)$

(b) [2] (§1.5 #18) Draw the graph of g if $g(x) = f(x) + \frac{1}{2}$.

(c) [1] (Quiz1 #2) Identify the range of f.

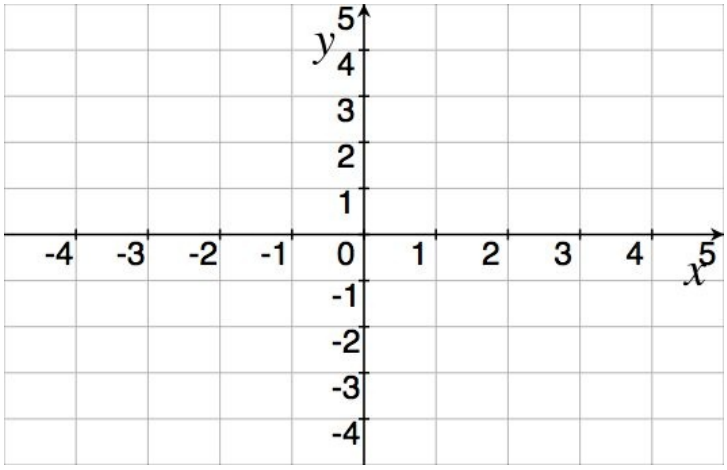
(d) [2] (WebHW2 #14) Find the average rate of change of f from $x = 20$ to $x = 80$

(e) [4] (PracticeExam#4) Find the piece-wise defined rule of f in the indicated form.

$$f(x) = \begin{cases} & \text{if } 0 \leq x < 57 \\ & \text{if } 57 \leq x < 90 \\ & \text{if } 90 \leq x \leq 100 \end{cases}$$

4. Let h be piece-wise defined by:

$$h(x) = \begin{cases} -2x + 3 & -3 < x \leq 1 \\ (x-2)^2 & 2 < x \leq 4 \end{cases}$$



(a) [3] (WebHW1 #19) Graph h.

(b) [2] (WebHW2 #11) Is h a function? Why or why not?

(c) [2] (§1.1 #48) Identify the y-intercept.

(d) [1] (Quiz1 #2) Find all possible input(s) so that $h(x) = 1$.

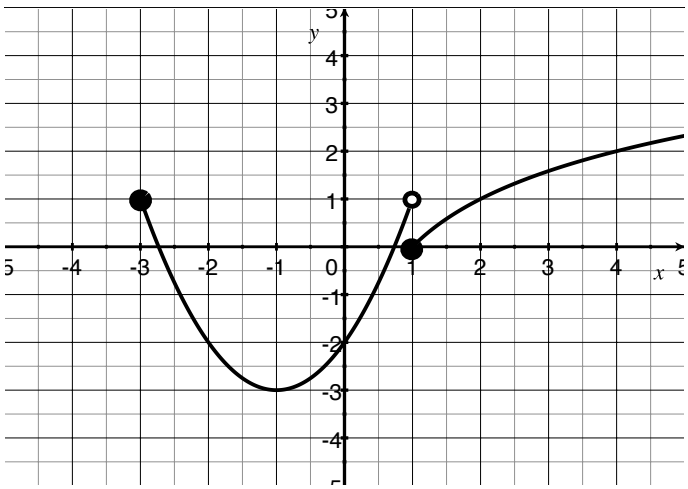
5. Let $\alpha(x) = \dfrac{x+1}{x+2}$ and $\beta(x) = 2 - \sqrt{x+1}$. Both α and β have inverses that exist.

(a)]2] Find the domain of β.

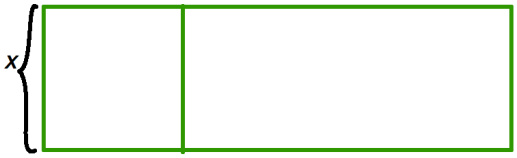
(b) [2] (§1.6 #38) $(\alpha \circ \beta)(x)$.

(c) [4] (§1.7 #55) Find $(\alpha^{-1})(x)$

6. [3] (WebHW3 #8) Let f be the function whose graph is shown to the right. Graph g where $g(x) = -\frac{1}{2}f(x)$.



7. [8] (WordProblem #5) A gardener wants to use 130 feet of fencing to enclose a rectangular garden and divide it into two plots, as shown in the figure to the right.



(a) [5] Find a function of x that represents the area of the garden.

(b) [3] Algebraically determine the largest possible area for such a garden.