

NAME:

1. [4] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let  $f$  and  $g$  be functions, and  $x$ ,  $y$ , and  $z$  be non-zero real numbers.

T F  $\frac{f(x)}{\frac{1}{2}} = f(x)\frac{1}{2}$

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

T F  $3x^{-2} = \frac{1}{3x^2}$

T F  $3x^{-2} = 3x^{\frac{1}{2}}$

T F  $(3 + 5i) - (4 - 2i) = -1 + 7i$

T F The graph of  $y = -x^2$  is increasing from  $(-\infty, 0)$ .

T F  $-2$  is a root of  $y = 3(2x + 2)(x - 1)(x + 4)$

T F  $\frac{3 + 5i}{1 - 2i} = \frac{-7}{5} + \frac{11}{5}i$

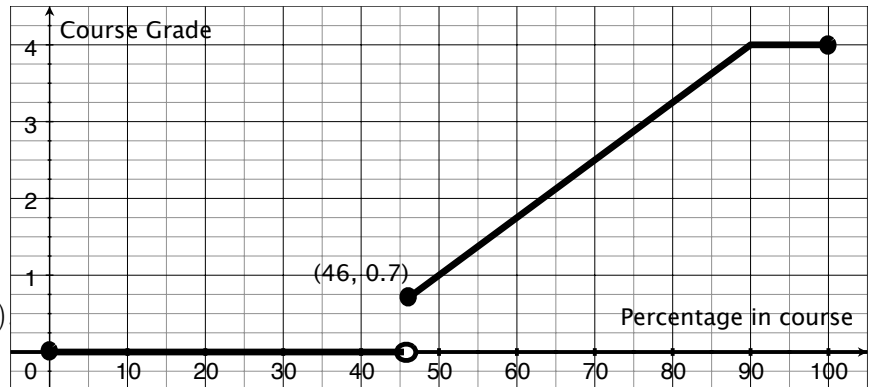
Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

2. [3] (Practice Exam1#2) Find all  $x$  so that:

$$3(7 + x)^{-2} = 6$$

3. The graph of a piece-wise defined function  $G$  is provided on the right.

- (a) [1] (§2.1 #26)  
Estimate  $G(60)$ .



- (b) [2] (§2.7 #27)  
Estimate  $(G \circ G)(80)$

- (c) [2] (§2.7 #11) Estimate  $G(70) - G(80)$ .

- (d) [2] (Quiz 1#1b) What is the range of  $G$ ?

- (e) [3] (Quiz 1#1c) Find a formula for the function  $G$  in the indicated form.

$$G(x) = \begin{cases} & \text{if } 0 \leq x < 46 \\ & \text{if } 46 \leq x < 90 \\ & \text{if } 90 \leq x \leq 100 \end{cases}$$

4. Let  $f(x) = \frac{1}{x+1}$ .

(a) [2] (§2.1 #41) What is the domain of  $f$ ?

(b) [3] (§2.8 #19) The function  $f$  is one-to-one. Find  $f^{-1}(5)$ .

(c) [4] (§2.8 #37) The function  $f$  is one-to-one. Find  $f^{-1}(x)$ .

(d) [5] (Quiz 1#2c) Find and simplify the *difference quotient* of  $f$  at 3, that is find and simplify

$$\frac{f(3+h) - f(3)}{h}.$$

5. [4] (§1.2 #63) Simplify the given expression

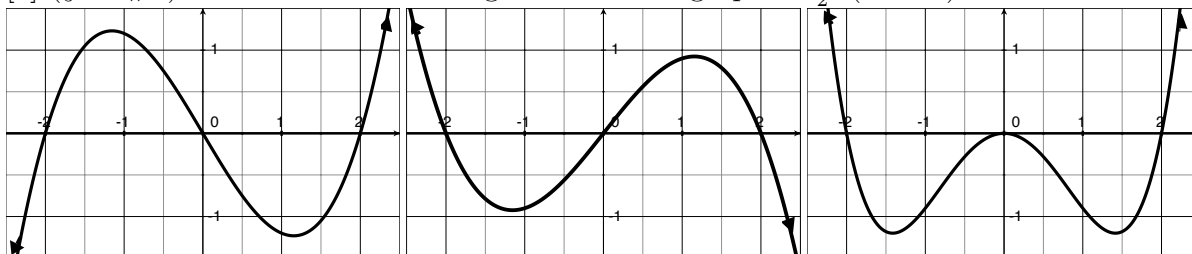
$$(2x^4y^{-\frac{4}{5}})^3(8y^2)^{\frac{2}{3}}$$

6. Let  $m(x) = 2x^3 + 2x^2 - 28x + 12$  and  $n(x) = 2x^2 + 8x - 4$ .

(a) [3] (§2.5 #15) Complete the square to write  $n$  in vertex (standard) form.

(b) [4] (§3.2 #17) Is  $n$  a factor of  $m$ ? That is, does  $2x^2 + 8x - 4$  divide into  $2x^3 + 2x^2 - 18x + 12$  with no remainder? Justify your answer.

7. [2] (§3.1 #5) Which of the following could be the graph of  $\frac{1}{2}x(x^2 - 4)$ ?



8. [6] (Story Problem Worksheet) Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.
- (a) (Word Problems Worksheet) You would like to set the price for a UWT fund-raising raffle. You did a similar thing last year and when you set the price to \$6 about 63 people bought tickets. The stats class did some research for you and reported that if ticket prices reduced by \$3.15, sales would increase by about 21 tickets. What price should you set the tickets so as to maximize income from ticket sales (to the nearest penny)?
- (b) (Word Problems Worksheet) Potassium ferrate has been considered for use in batteries but costs \$100 per gram. You have a battery case that is currently *full* with 50 grams of a mixture that is 10% potassium ferrate. You would like to build the battery but you need a higher concentration of the potassium ferrate (40% should do it). What is the minimum amount of potassium ferrate you will have to buy and add to the battery case (after you dumped out some of the original mixture to make room) to get the cathode to work?