Math113 College Algebra
First Midterm Exam
Colorado Mesa University Spring 2024

NAME: _____

1. If f is a function that triples its input and then subtracts one, what is the value of $f(2)$?
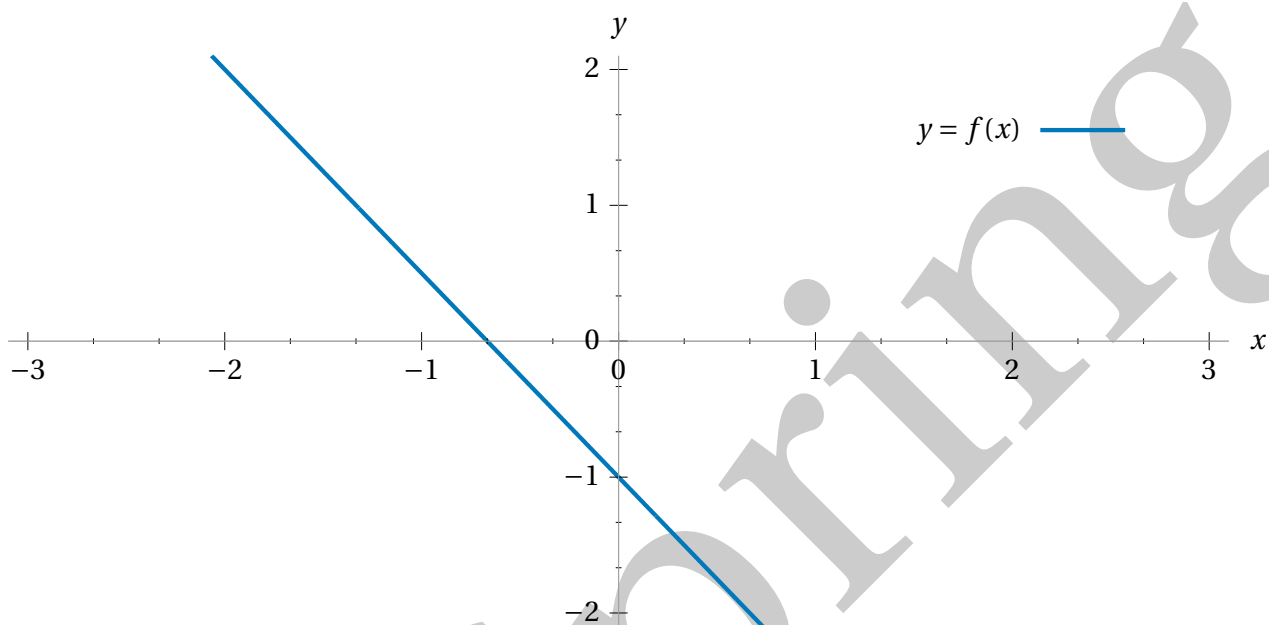
2. This table reports input/output pairs for a function g. What is the value of $g(3)$?

x	-1	0	2	3	4	5
$g(x)$	3	22	0	9	32	-1

3. What's an equation for the line that intersects the y-axis at $\frac{5}{2}$ and has a slope of -3?

4. Does the point $(4,2)$ lie on the graph of the function $h(x) = \frac{1}{30}x^3 - \frac{1}{8}$? In one sentence, state how you figured out the answer this question.

5. Consider this graph of the functions f.

(a) Estimating, what is $f(-1)$?

(b) Estimating, for what values(s) of x does $f(x) = 0$?

(c) From the graph, f appears to be a linear function. What's a plausible formula for f?

(d) What's an equation of the line that is parallel to f and passes through the point $(0, 7)$?

(e) On this same set of axes above, accurately plot the graph of the function $g(x) = \frac{1}{2}x + 1$.

6. Recall the formula for the future value A of an initial investment of P dollars at a simple annual interest rate r invested for t years is given by the formula $A = P(1 + rt)$.

   (a) Solve this equation for t in terms of the other variables.

   (b) If you have \$420 available to invest, at an interest rate of 3.81%, how many years will it take to appreciate to a worth of \$500?

7. I recently planted a tree! Occasionally, since planting the tree, I would measured the height of the tree (in feet) and record the measurement:

Days since planting the tree	7	15	20	30	36	44
Height of the tree in feet	5.5	5.8	6.0	6.4	6.5	6.6

(a) Using technology perform *linear regression* to find a linear model f for the height of the tree x days after I planted it. Write the formula for your model below with parameters rounded to three decimal places.

(b) According to your model, at what *rate*, measured in *feet-per-day*, is the tree growing? Can you express that same rate in *inches-per-week*?

(c) What is the significance of the y-intercept of the graph of f in the context of the situation?

(d) (EXTRAPOLATE) Assuming this model remains accurate beyond the domain of the data, how tall will the tree be sixty days after I planted it?

(e) (EXTRAPOLATE) Assuming this model remains accurate beyond the domain of the data, How many days after being planted will the tree be eight fee tall?

(f) Do you think a linear function is a reasonable choice of model to accurately describe this situation in the long run? (Write down your thoughts, list pros and cons, etc)

8. What number must x be if

$$\frac{2x-3}{5} = x - 7?$$

9. Cleopatra has $8000 available in capital, and is considering two different funds to invest her money:

- A safe money-market fund through her local credit union offering a 1.7% annual return.

- A high-risk investment in a Canadian diamond mining venture projecting 3.2% annual return.

Splitting her investment between these two opportunities, how much should she invest in each to expect a 2% annual return?

* (OPTIONAL) The prompts on this exam were designed to elicit evidence of your understanding of the mathematics we've discussed in this course. But perhaps you've learned things that weren't prompted for. Perhaps you've gained some mathematical understanding that you haven't had an opportunity yet to exhibit on this exam. Now is your opportunity. On this page, demonstrate anything you've learned in this class that you haven't already gotten a chance to present on this exam.