

Math113 College Algebra
First Midterm Exam
Colorado Mesa University · 2026 Fall

NAME: _____

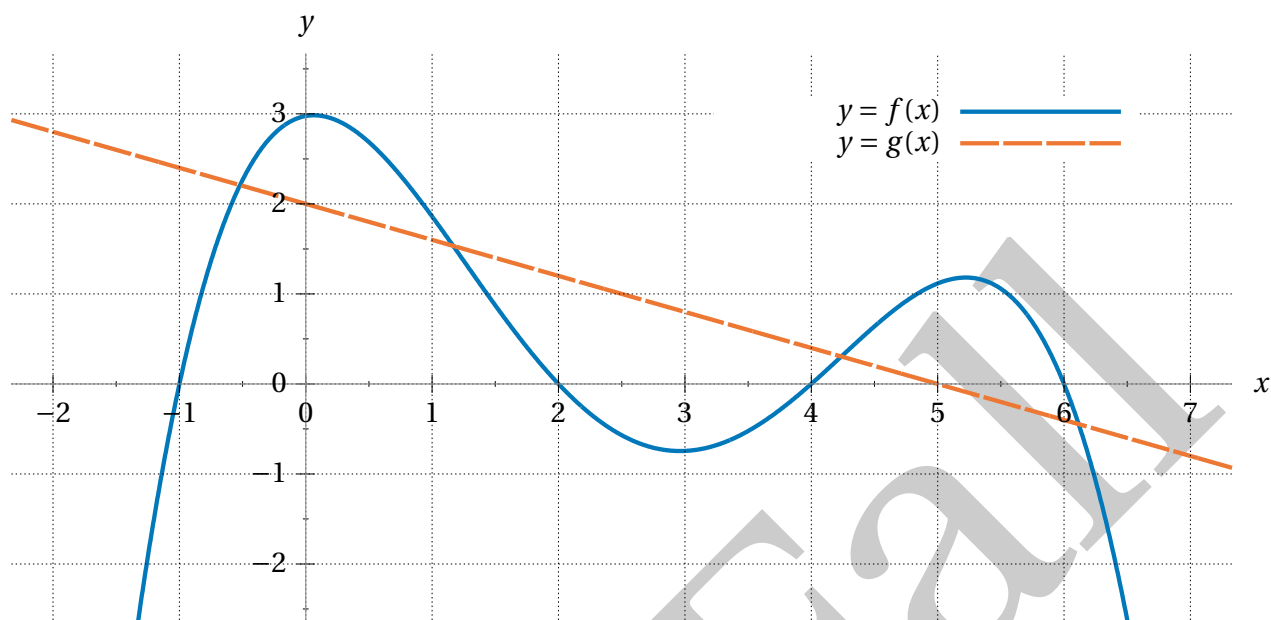
1. What's the slope of the line $7y - 21 = x$?
2. What's the x -coordinate of the point on the line $7y - 21 = x$ that has a y -coordinate of 5?
3. What's an equation of the line parallel to $7y - 21 = x$ that has a y -intercept of fifteen?

4. This table reports input/output pairs for a function f . For what value(s) of x does $f(x) = 71$?

x	99	14	-2	23	44	33	15	19	-7	-9	12
$f(x)$	34	71	78	32	17	-4	22	95	71	-1	19

5. Does the point $(71, 71)$ lie on the graph of the function $f(x) = 1 + \frac{x^3}{5113}$? In one or two sentences describe how you figured out the answer this question.

6. Below is the graph of a non-linear function f and the graph of a linear function g .



- Estimating, based on its graph, what is the value of $f(3)$?
- Estimating, based on its graph, for what value(s) of x does $f(x) = 0$?
- Estimating, based on its graph, what appears to be the range of f ?
- What is a plausible formula $g(x)$ for the linear function g ?
- What is an equation for the line perpendicular to the graph of g that passes through the point $(0, -2)$? Sketch the graph of this line on the axes above.

7. Cleanthes spends his working hours carrying buckets of water from the wells on the outskirts of town to the public cistern in the town square. Starting his work at 3am, Cleanthes notices the cistern is almost full already: it holds 1000 gallons and the water level is at around the 912 gallon mark. Working through the morning hours, Cleanthes notes that at 5:30am the water level in the cistern is at the 967 gallon mark. If he continues carrying water and emptying into the cistern at a constant rate, at what time should Cleanthes expect to have completely filled the cistern?

8. The future value S of an initial investment of P dollars that will accrue *simple* interest at an annual interest rate r over the course of t years is given by the formula $S = P(1 + rt)$.

(a) Solve this formula for r in terms of the other variables.

(b) If \$12 000 invested in an account that accrues simple interest and is projected to appreciate to a worth of \$13 632 in eight years, what must the interest rate on the account be?

9. Here is data for the population of Mesa County for select decades.

Year	2020	2010	2000	1990	1980	1970	1960	1950	1940
Population (in thousands)	155.7	146.7	116.3	93.1	81.5	54.7	50.7	38.8	33.8

From https://en.wikipedia.org/wiki/Mesa_County,_Colorado.

- (a) Using technology, perform linear regression to determine a function of the form $f(x) = mx + b$ that models the population of Mesa County. Write the formula for your model here.
- (b) What is the value of the parameter m in your model, and what is its significance in regards the population of Mesa County?
- (c) (EXTRAPOLATE) Assuming the linear model remains accurate beyond the domain of the data, what does it predict the current population of Mesa County to be?
- (d) The population of Pueblo county on the Colorado front range is slightly higher than Mesa county's, but is growing at a slower rate. In the year 2000 Pueblo county had a population of about 140,000 people, and has been growing at a rate of about 1100 people-per-year since. Write down a linear model for Pueblo's population and determine the year that these models indicate Pueblo and Mesa county's populations will be the same.