Math 120 Exam 1 Practice

The following pages contain screenshots of past exam problems organized by topic, along with links to the full exams, solutions, and additional practice. All materials are drawn directly from the exam archive.

To access the complete exam and solutions, click the indicated link on each page. Here is the link to the full exam archive. As you study old exams it is good to look the old exams written by your instructor first, then look at others.

Your primary focus in preparing should be mastering the concepts covered in lecture, the textbook, and the homework. Be sure to review **all** homework problems. This review is intended to reinforce the key concepts and help guide you in identifying areas where you may need to focus more effort.

Topics included in this Practice Sheet

- Topic 1: Linear equation and modeling
- Topic 2: Speed, distance and motion
- Topic 3: Circles and intersections with lines
- Topic 4: Functional Notation and Algebra
- Topic 5: Graphs and Multipart functions
- Topic 6: Quadratics equations and modeling.

Summary Sheet: All my review material is here: Dr. Loveless Math 120 Review Page. Specific review material that may be helpful for exam 1 is also listed below:

- Problem-Solving Routine Suggestions
- Math 120 Exam 1 Review

  And here are my section specific review sheets:

  - Ch 1-2 Review: speed, distance, time, coordinates
  - Ch 3 Review: Circles
  - Ch 4 Review: Lines
  - Ch 5 Review: Functions
  - Ch 6 Review: Graphs and Multipart Functions
  - Ch 7 Skills Review: Quadratic Skills
  - Ch 7 Modeling Review: Quadratic Modeling

Topic 1: Linear equations and modeling

Homework Examples:

- Ch 4: Seattle home prices and Angela/Tiff/Mary, etc.

Old Exam Screenshot: Problem 1 from Loveless Fall 2008 Exam 1

1. (10 points) The (average) monthly rent for an apartment in Funtown and Boreville is tabulated below:

YEAR	FUNTOWN	BOREVILLE
1960	\$100	\$150
1990	\$400	\$210

Let x = the year, $f(x)$ = the rent in Funtown and $g(x)$ = the rent in Boreville. Assume that the average rents for Funtown and Boreville (*i.e.* $f(x)$ and $g(x)$) are **linear functions** of the year x.

Find the linear functions and answer the following question: For what value of x will it cost \$500 more on average to rent in Funtown than in Boreville? (leave your answer as a decimal)

Old Exam Screenshot: Problem 2 from Loveless Fall 2005 Exam 1

2. (10 points) Brad is standing 50 ft north of Matt. Matt runs toward a location 60 ft east and 30 ft north of his current position.

   (a) At what location will Matt be closest Brad?

   (b) Matt and Brad both run directly at the location from part (a). If Matt will get there in 3 seconds, how fast, in ft/sec, does Brad have to run so that they both arrive at the same time?

More Practice:

- Problem 1 from Loveless Fall 2007 Exam 1: Populations of Mongo and Parn
- Problem 2 from Conroy Spring 2009 Exam 1: Tangent Line to a Circle Problem
- Problem 2 from Conroy Winter 2007 Exam 1: Population of Kangaroo

Topic 2: Speed, distance and motion

Homework Examples

- *General*: Ch 2: Kingston Ferry, Allyson/Adrian Bungee, Time to Kono's restaurant, etc.
- *Linear Parametric*: Ch 4: Margot and the Statue, Ch 7: Sven and Rudyard

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Old Exam Screenshot: Problem 2 from Loveless Fall 2009 Exam 1

2. (11 points) Peyton and Eli start running at the same time at constant speeds on straight line paths in the coordinate system (*i.e.* they are exhibiting **uniform linear motion**). Peyton starts at the point $(-2, 11)$ and runs toward the point $(5, -13)$ at a constant speed of 4 ft/sec (the coordinate points are in feet).

   (a) (6 pts) Find the parametric equations that describe Peyton's uniform linear motion.

   (b) (5 pts) Eli starts at the point (10,7) and he runs toward the point where Peyton crosses the y-axis. How fast does Eli need to run in order to reach this point at the same time as Peyton? (Give Eli's speed in ft/sec)

More Practice:

- Problem 2 from Ostroff Spring 2024 Exam 1: Robin and Victoire are walking
- Problem 1 from Conroy Spring 2018 Exam 1: Biking near a Bear
- Problem 3 from Nichifor Winter 2019 Exam 1: Eric Rowboat
- Problem 4 from Nichifor Winter 2019 Exam 1: Lassie goes for a run

Topic 3: Circles and intersections with lines

Homework Examples:

- Ch 3: Ferris Wheel, Erik's Radar; Ch 4: Golf Problem

Old Exam Screenshot: Problem 3 from Loveless Fall 2007 Exam 1

3. (12 points) Assume a cell phone tower on top of Mount Rainier gives cell phone coverage to anyone at or within a 5 mile radius of the tower. In the morning, Danny is 7 miles south and 2 miles west of the tower. Then Danny hikes at a constant speed of 6 miles per hour on a straight line through the northernmost point of the coverage area.

   During Danny's hike, how long (in hours) was he within the cell phone tower coverage area?

Old Exam Screenshot: Problem 4 from Loveless Fall 2008 Exam 1:

4. (10 points) A certain radio station broadcast can be picked up by any radio within a radius of 10 miles. George gets on his bike at a location 2 miles north and 3 miles west of the radio station and he puts on his radio headphones. George travels due east at 10 miles/hour for 30 minutes and then he turns due south continuing at 10 miles/hour. Let t = the time in *hours* since George started biking.

   At what time, t, will George no longer be able to receive the radio broadcast? (That is, when does he leave the circular broadcast region?)

More Practice:

- Problem 2 from Loveless Winter 2006 Exam 1: Whale Watching
- Problem 1 from Loveless Fall 2009 Exam 1: Golf Problem
- Problem 1 from Ostroff Spring 2024 Exam 1: Lightrail Problem
- Problem 2 from Conroy Spring 2018 Exam 1: Circular Forest

Topic 4: Functional Notation and Algebra

Homework Examples

- Ch. 5: Difference quotient, linear function graphs, solving for "trapped" variables

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Old Exam Screenshot: Problem 1 from Loveless Winter 2006 Exam 1

1. (8 points) Let $f(x) = 1 + 2x - 3x^2$.

   (a) Simplify the following expression far enough so that plugging in $h = 0$ would be allowed.

$$\frac{f(x+h) - f(x)}{h}$$

More Practice:

- Problem 2(a) from Loveless Fall 2007 Exam 1: Functional Notation
- Problem 3(c) from Loveless Fall 2009 Exam 1: Functional Notation
- Problem 3(a) from Loveless Fall 2008 Exam 1: Functional Notation

Topic 5: Graphs and Multipart functions

- *Homework Examples*
  - Ch. 6: Absolute values, multipart functions, labeling graphs for height and area

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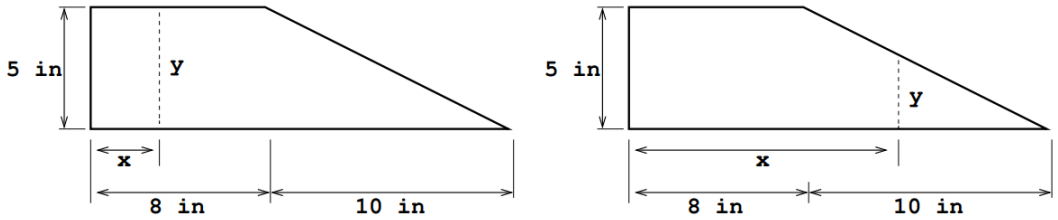
Old Exam Screenshot: Problem 4 from Loveless Fall 2009 Exam 1*:*

4. (12 points) Two geometry teachers get married and have a trapezoidal cake at their wedding (the view from above the cake is given). A vertical cut is made at a location x inches from the left edge and the length of the cut is labeled y. This breaks the cake into two pieces (the one on the left and the one on the right). Two possible scenarios are depicted below depending on the location of the cut.



(a) (5 pts) Find a formula for y as a multipart function of x

(b) (4 pts) Find a formula for the area of the piece to the left of the cut as a multipart function of x.

More Practice:

- Problem 4(b) from Loveless Fall 2006 Exam 1: Solving with multipart functions
- Problem 4(a) from Conroy Spring 2018 Exam 1: Solving with multipart functions
- Problem 5 from Loveless Fall 2008 Exam 1: Area multipart formula problem
- Problem 3 from Ostroff Spring 2024 Exam 1: Area multipart formula problem
- Problem 3 from Conroy Spring 2018 Exam 1: Area multipart formula problem
- Problem 1 from Nichifor Winter 2019 Exam 1: Graphing, solving and mulitpart problem

Topic 6: Quadratics equations and modeling.

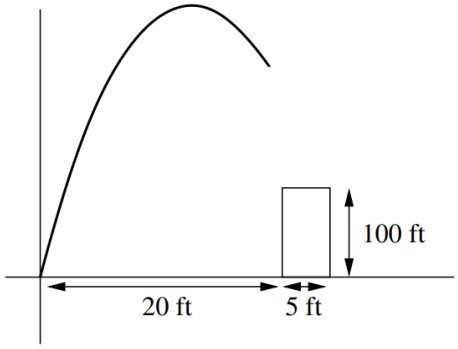
Homework Examples:

- Ch 7 (pt 1): Mechanics of vertex and quad formula,
- Ch 7 (pt 2): Applications to maximum area or maximum revenue or minimum distance, etc.

Old Exam Screenshot: Problem 3(a)(b) from Loveless Fall 2009 Exam 1:

3. (14 points) Kurt kicks a soccer ball from the origin in the coordinate system below. A silo that is 5 feet wide and 100 feet tall is 20 feet from the location where Kurt kicked the ball. The ball follows the path given by the quadratic function $f(x) = -2x^2 + 53x$. This situation is sketched below (the graph may not be to scale).

   (a) (4 pts) Give the x and y coordinates of the highest point the ball reaches.

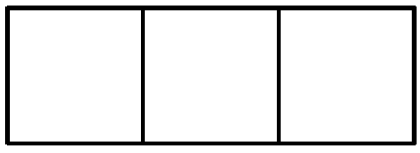


   (b) (5 pts) If the ball continues on this path, will it hit the top of the silo? If so, give the (x, y) coordinates of where it lands on the top. If not, explain why.

Old Exam Screenshot: Problem 2 from Loveless Fall 2008 Exam 1:

2. (10 points)

   Danny has 950 feet of fencing to make a rectangular enclosure with two parallel interior fences that divide the enclosure into three regions as show. What dimensions will maximize the area of the enclosure?



More Practice:

- Problem 4 from Loveless Fall 2007 Exam 1 Bill's Maximum Revenue
- Problem 3 from Loveless Winter 2006 Exam 1 : Kramer's Maximum Apple Production
- Problem 3(b) from Loveless Fall 2008 Exam 1: Find vertex
- Problem 3 from Ostroff Spring 2024 Exam 1: Find quadratic function
- Problem 2 from Nichifor Winter 2019 Exam 1: Maximize area