

Math 120 – linear-to-linear models Test Prep – Dr. Loveless

Please attempt to start this first problem at the beginning of quiz section (5-10 minutes). This comes directly from an old exam. Then compare with classmates and discuss with your TA if you have questions.

Participation Code: The participation code for today is the answer to part (b) of the question on this page.

[W06 Loveless Exam 2 Question]

Dr. Loveless is getting ready for a tennis tournament. The speed of his serve, y , is a linear-to-linear function of the number of practice balls, x , he hits before the tournament.

- If he hits no practice balls, then the speed is 85 mph.
- If he hits 100 practice balls, then the speed is 105 mph.
- Dr. Loveless knows from his younger days that if he keeps increasing the number of practice balls, his serve speed increases and approaches (but never exceeds) 130 mph.

(a) Find the linear-to-linear rational model that gives serve speed, y , in terms of the number of practice balls, x .

(b) How many practice serves should Dr. Loveless hit so that his serve speed is exactly 125 mph?

For grading rubrics see: <https://sites.math.washington.edu/~m120/Win06/loveless/w06Math120e2v1Soln.pdf>

Personal Note: Sadly, this problem is no longer accurate I am too old to hit 125 mph on my serve without my arm falling off. I hit a good serve for an old guy, but I doubt it ever gets above 110 mph anymore (and that is being optimistic).

Note: Please STOP now and ask your TA about the chapter 14 and chapter 15 homework. That is the priority now. BUT some students told me they felt like they didn't have enough practice problems going into exam 1, so I wanted to remedy that (at least for this topic) and give you lots and lots and lots of practice on the following pages and you can try these and look at the exam archive, cool? Again, the priority is to ask about homework now, but check these out later if you are still fuzzy on this topic. If you can do all these, then you will definitely do well on one the pages on the exam 2!

[F05 Loveless Exam 2 Question]

The fans of the local Mudville baseball team only seem to care about homeruns.

- When the team hits 50 homeruns in a season, the attendance is 6 million fans.
- When the team hits 100 homeruns in a season, the attendance is 13 million fans.
- The more homeruns the team hits, the closer and closer the attendance gets to 20 million fans.

(a) Find the linear-to-linear model that gives attendance as a function of homeruns.

(b) Using your model, how many homeruns does the team have to hit to get exactly 18 million fans to attend?

Full Solutions: <https://sites.math.washington.edu/~m120/Aut05/loveless/Math120Fall05e2v1Solutions.pdf>

[W15 Ostroff Exam 2 Question]

Rebecca is training to become a competitive eater. The time it takes her to eat a lobster is a linear-to-linear rational function of how long she spends practicing.

- Without any practice, she can eat a lobster in 8 minutes.
- If she practices for three weeks, she can finish it in 5 minutes and 6 seconds.
- If she practices for fifteen weeks, she can finish it in 3 minutes and 10 seconds.

How long should she practice in order to finish it in 2 minutes and 30 seconds?

[W16 Ostroff Exam 2 Question]

The function $y = f(x)$ is a linear-to-linear rational function such that the curve passes through the points $(1, -9)$, $(10, 60)$ and has the vertical asymptote $x = 7$.

(a) Find the function $f(x)$.

(b) Find the inverse of the function $f^{-1}(x)$.