

Math 120/ALES 291 Final Exam

Examinable Topics, Weights, and Problem Types

Note that the mark weights shown here are approximate, say ± 5 . You'll notice that here they add to 190, but on your exam they will add to 180, so there will be a little cutting here, a little adding there, as I make up the actual exam questions.

<i>Marks</i>	<i>Topic</i>
10	Linear Models • $y = mx + b$ and $Ax + By = C$ • Translate between English, equation, data points and graph. • Probably a word problem, e.g. 2014¹#1, 2020#1
0	Systems of Equations Using Matrices • Not directly examined!
20	Linear Programming: Graphical Solution • An entire word problem done from start to finish, e.g. 2014#2, 2020#2
15	Linear Programming: Simplex Method You won't be asked to solve an entire problem from start to finish (too much pivoting!). Instead you will be asked about individual steps in the process: • e.g. Choose the next pivot (maximization or minimization, remember the rules differ!) • e.g. Choose the next pivot and pivot the tableau once 2014#3, 2020#3 • e.g. Interpret a tableau, including shadow prices and sensitivities, e.g. 2014#4, 2020#4
15	Nonlinear Models and Functions • Quadratic, Log/Exponential/Logistic, Sinusoidal • Sketch given equation, e.g. 2014#5 • Write equation given graph, e.g. 2014#6, 2020#5 • Formulate and use, e.g. Given values at two points in time find rate of exponential growth, e.g. 2020#6
30	Derivatives • Given picture of a function sketch its derivative, e.g. 2014#7, 2020#7 • Find the derivative of a given function, e.g. 2014#8 • Optimization word problem $f'(x) = 0$, e.g. 2020#9 • Differential Equations: Is this function a solution to this DE, e.g. 2014#9, 2020#8

¹ 2014 = 2014 Final Exam
 2020 = 2020 Final Exam
 ES = Exercise Set

	• Sketch the trajectory of a system through phase space, e.g. 2014#10, 2020#10
15	Integrals • Find the integral of a function. • Small word problem, e.g. 2014#11, 2020#11
30	Probability • ‘Simple’ probabilities $p(A), p(B), 1 - p(A)$, e.g. 2014#12, 2020#12. • Conditional probabilities $p(A B)$ • Probability trees, e.g. fill in missing values • Bayes theorem (always a word problem), e.g. 2014#13, 2020#13 • Combinatorics, e.g. 2014#14, poker hand problems. • Bernoulli trials and Binomial distribution, e.g. ES 11.2
30	Graph Theory • Graph properties: # nodes, # edges, loops?, directed or not, draw graph given matrix, e.g. 2014#15 • Minimal Spanning Tree on graph and in matrix, e.g. 2020#14 • Shortest Route on graph and in matrix, e.g. 2014#16, 2020#15 • TSP heuristics: nearest neighbour, sorted edges • Connectivity/Reachability: I won’t ask you to multiply matrices, but might ask you to interpret them. Or to find some individual entries in a product, e.g. 2020#16
15	Markov Processes • A small word problem, e.g. 2014#17, 2020#17, 2020#18
10	Teacher’s choice • Something a bit different, but based on the course material.