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| Bootcamp Final  Summer 2023  Prof David Shimko | Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  NYU ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Instructions: Take no more than two hours to complete this exam. You may refer to your notes and any class materials, but not the Internet and not anyone else. Answer essay questions in no more than two sentences.

**Lecture 1 (10 points)**

A Tbill maturing in 60 days has an asking quote of 5.26. What is the price of the bill and zcb continuously compounded yield?

**Lecture 2 (10 points)**

You have a bond A with 5% coupon, bond B with 3% coupon, and bond C a zero-coupon bond. All else equal, arrange them in decreasing order of their duration and give brief explanation.

**Lecture 3 (10 points)**

What is preferred stock? In what ways does it resemble both debt and equity?

**Lecture 4 (10 points)**

What are the three greatest risks for companies that use futures contracts to lock in the price of their output? How should companies address these risks?

**Lecture 5 (10 points)**

What’s the difference between a line of credit (LOC), a letter of credit (LC), and a HELOC?

**Lecture 6 (10 points)**

What is a PAC CMO and how does it control the risk for the PAC?

**Lecture 7 (10 points)**

Find X s.t. ln(X) = 2 using the Newton-Raphson method. Show at least two steps, starting from X0=1.

**Lecture 8 (10 points)**

What values of x and y maximize (x+y)2 while x2 + y2 = 1 ?

**Lecture 9 (10 points)**

If matrix , what are principal components of A? (Hint: ))

**Lecture 10 (10 points)**

What is the Cholesky decomposition of the following matrix?

How is the Cholesky decomposition used to generate correlated random variables from uncorrelated random variables? Only give the idea in 2 lines.