

Final Exam Conceptual Review

MATH 146, Fall 2019

- Our Final Exam is on **Tuesday, December 17** from **4:30-7:00 pm** in our classroom.
- The exam is **cumulative**, and will cover the material from class related to the the text. Please review to the posted Conceptual Reviews on material before Midterm 2. Though the exam is cumulative, the Final Exam will emphasize the new concepts that have not yet been covered on an exam:

12.1 – 12.5, 7.8, 11.3 – 11.4,

arc length in 8.1, 11.1, and 11.4, and complex numbers.

- The best preparation is to **practice, practice, practice** working and re-working problems. This includes **book problems** and **quiz problems**.
 - Check out the **Daily Update** to check whether you are familiar with all the topics.
-

Vector geometry (12.1 – 12.5)

- **Concepts:** Vector in \mathbb{R}^2 or in \mathbb{R}^3 , components of a vector, parallel/perpendicular vectors, algebra of vectors, linear combination of vectors, distance between vectors, norm of a vector, unit vector, (parametric) equations in three dimensions (sphere, cylinder, line, plane), right-hand rule, dot product of vectors, projection of a vector along another vector, matrix, determinant, cross product of vectors
 - **Goals** and associated homework problems/practice problems:
 - Carry out basic calculations involving vectors: 12.1: #5, 7, 11, 19, 26, 28, 29, 53, 55, 59, 61 / 1, 21, 27, 41, 57 12.2: #17, 31 / 4, 29, 32
 - Apply vectors to solve problems in physics: 12.1 #63, 64 / 65; 12.5: 64 - 66 / 63
 - Find/use equations for lines, planes, cylinders, and spheres in three dimensions: 12.2: #35, 37, 45, 47, 49 / 39, 41, 51
 - Calculate a dot product, and apply it (e.g., to find the angle between vectors): 12.3: #17, 23, 33, 35, 47, 51, 65 / 33, 34, 50, 63
 - Calculate a cross product, and apply it (e.g., to find an area or volume): 12.4: #3, 5, 9, 11, 25, 29, 31, 37, 39, 44, 45 / 27, 41, 54, 61
-

Probability and integration (7.8)

- **Concepts:** Probability density function, random variable
 - **Goals** and associated homework problems/practice problems:
 - Determine whether a function is a probability density function: 7.8: #3, 6, 10 / 1
 - Use/investigate a probability density function: 7.8: # 13, 23 / 15
-

Polar coordinates (11.3 – 11.4)

- **Concepts:** Polar coordinates, polar curves
 - **Goals** and associated homework problems/practice problems:
 - Move between polar and Cartesian coordinates: 11.3: #1, 3, 5, 13, 15, 26, 32 / 33
 - Graph in polar coordinates: 11.3: #7, 31, 34 / 23, 30
 - Find equations in polar coordinates: 11.3: # 27 / 8, 9
 - Calculate/apply the slope of the tangent line to a point in polar coordinates: 11.3: #53, 55 / 52, 57
 - Compute areas defined by polar curves: 11.4: 5, 9, 10, 13, 14, 19 / 4, 6, 15, 16
-

Arc length (8.1, 11.1, 11.4)

- **Concepts:** Arc length
 - **Goals** and associated homework problems/practice problems:
 - Compute arc length of a parametric equation: 11.1 #1, 3 / 5, 9
 - Compute arc length of a polar curve: 11.4: #25, 27 /
 - Compute arc length of a Cartesian equation: 8.1: #4 / 17
-

Complex numbers

- **Concepts:** Complex number, real/imaginary part of a complex number, complex plane, complex norm, complex conjugate
- **Goals** and associated practice problems:
 1. Calculate the real part, imaginary part, complex conjugate, and norm of the following complex numbers: (a) $4 + 5i$ (b) $4 - 5i$ (c) $11 + 10i$ (d) i (e) $-i$ (f) 7.
 2. Graph the complex numbers from (1) in the complex plane.
 3. Calculate: (a) $(4 + 5i)(11 + 10i)$ (b) $(4 + 5i)^3$ (c) i^{100} .
 4. Calculate $e^{i\pi}$ using the Maclaurin series for e^x .