Correlation of CCSS to Miller, *Precalculus,* 1e

Common Core State Standards, Traditional Fourth Course Pathway	*Precalculus 1/e* (Hardcover)
The Complex Number System N-CN	
Perform arithmetic operations with complex numbers. 3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	75-76, 80 #4, #47-56, 714
Represent complex numbers and their operations on the complex plane. 4. (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	713-716, 722 #1-3, #7-8, #15-30
5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.	723 #31-42
6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	722 #9a-14b
Vector and Matrix Quantities N-VM	
Represent and model with vector quantities. 1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, $\mathbf{v}$).	726-728, 738-739 #1-2, #8-9, 740 #69-74
2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	729 #11-16, #21-30
3. (+) Solve problems involving velocity and other quantities that can be represented by vectors.	740-741 #79-88, #95-96, 743 #111-114
Perform operations on vectors. 4. (+) Add and subtract vectors. a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	729-731, 739-740 #17-20, #31-38, #43-44, 741 #89-94
b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	736-738, 740 #61-68, 742 #105-106
c. Understand vector subtraction $\mathbf{v} - \mathbf{w}$ as $\mathbf{v} + (-\mathbf{w})$, where $-\mathbf{w}$ is the additive inverse of $\mathbf{w}$, with the same magnitude as $\mathbf{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	728-731, 742 #97-102
5. (+) Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.	740 #39-42, 45, 46,

b. Compute the magnitude of a scalar multiple $c\boldsymbol{v}$ using $\|c\boldsymbol{v}\| = \|c\|\boldsymbol{v}$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\|c\|\boldsymbol{v} \neq 0$, the direction of $c\boldsymbol{v}$ is either along $\boldsymbol{v}$ (for $c > 0$) or against $\boldsymbol{v}$ (for $c < 0$).	730, 738 #4, 740 #54, 742, #109
Perform operations on matrices and use matrices in applications. 6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	868 Ex 8, 869, 872 #69-78
7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	863-864, 871 #33-48
8. (+) Add, subtract, and multiply matrices of appropriate dimensions.	861-862, 866-867, 870-872 #23-32, #49-68
9. (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	867, 870 #7, 871-872 #49-54, #65-68
10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	876-882, 883-884 #9-34
11. (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	872 #75-78, 882 ex 7, 884 #39-50
12. (+) Work with 2 × 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	869 ex 9, 874 #79-84, 897 #57-58
Algebra	
Reasoning with Equations and Inequalities A-REI	
8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.	881-882, 884 #35-50
9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).	881-882, 884 #39-50
Functions	
Interpreting Functions F-IF	
Analyze functions using different representations. 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. • d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	299-314, 316-319 #7-90
Building Functions F-BF	
Build a function that models a relationship between two quantities. 1. Write a function that describes a relationship between two quantities. • c. (+) Compose functions.	220-222, 226 #47-86
4. Find inverse functions. b. (+) Verify by composition that one function is the inverse of another.	357, 359-360 ex 4, 360 Skill Practice 4, 364-365 #5, #31-38

c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.	356-357, 363-365 #1-2, #6, #71-76, #78-79
d. (+) Produce an invertible function from a non-invertible function by restricting the domain.	362 ex 7, 363 ex 8, 366 #55-56, 367 #90
5. (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	381-384, 392 #9-50
Trigonometric Functions F-TF	
Extend the domain of trigonometric functions using the unit circle. 3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.	486-487, 493 #25-32, 583-584, 588 #41-46, #54, 618 #29-32
4. (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	463-470, 474-475, 479 #59-74
Model periodic phenomena with trigonometric functions. 6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	549-550, 551-553 #1, #17-36, #47-70, 616, 619 #57-62
7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. •	548, 553 #77-84, 555 #109-110
Prove and apply trigonometric identities. 9. (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	578-581, 587 #7-26
Expressing Geometric Properties with Equations G-GPE	
Translate between the geometric description and the equation for a conic section. 3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	908-910, 920-921 #43-56, 925-927, 937-938 #33-50
Geometric Measurement and Dimension G-GMD	
Explain volume formulas and use them to solve problems. 2. (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	*Glencoe Precalculus* Student Activity Connect to AP Calculus 7 Teacher Answer Key Connect to AP Calculus 7
Statistics and Probability	
Using Probability to Make Decisions S-MD	
Calculate expected values and use them to solve problems. 1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2
2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2

3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2
4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2
Use probability to evaluate outcomes of decisions 5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2
b. Evaluate and compare strategies on the basis of expected values.	*Glencoe Precalculus* Student Activity 11-2 Teacher Answer Key 11-2