• By-Hand Exam 3 covers 6.5, 6.6, 6.7, 6.8, 7.1, 7.2, 7.4, 7.5, 7.6, 8.8, 1.8, 11.1, 11.2, 11.4.

• For Sec 6.5 - Definite Integral: The two types of questions that may be asked from this section are 1) evaluate the definite integral by using geometry formulas - either sketching curve (problems 11, 13acd, 15) or graph could be given to you and 2) apply properties of definite integrals to determine the value of an integral or a few integrals (Q13, problems 17, 18, 19, 21)

• For Sec 6.6 - Fundamental Theorem of Calculus: Be able to apply the Fundamental Theorem of Calculus part I (Q13, problems 9, 11, 13, 19, 25) to evaluate definite integrals and to apply the Fundamental Theorem of Calculus part II (problems 55, 56) to find derivatives.

• For Sec 6.7 - Rectilinear Motion with Integration: Be able to find the position function of a particle when given either the velocity or acceleration function and some initial conditions (Q13, problems 5a, 7, 8) and given the velocity function, find the displacement and distance traveled on a given interval (problems 13, 14).

• For Sec 6.8 - Integrals by Substitution: Given the function $u$, rewrite the given integral into an integral in terms of $u$ (problems 1, 2ad, 3).

• For Sec 7.1 - Area between Curves: You should be comfortable setting up the integral(s) needed to find the area between two curves - you may need to sketch the curves first and shade in the area and you may also need to find the intersection points of the curves to determine the limits of integration (problems 1, 2, 3, 4, 5, 7)

• For Sec 7.2 - Volumes: Set-up the integral(s) needed to find the volume of a region that is revolved about either the $x$ or $y$ axis (problems 1, 2, 3, 4, 7, 9, 13, 15, 19, 23). A graph of the region will be provided.

• For Sec 7.4 - Arc Length: Set-up the integral(s) needed to find the length of the curve over a given interval (problems 3, 4, 5, 6). A graph of the curve will be provided if beneficial.

• For Sec 7.5 - Area of a Surface of Revolution: Set-up the integral(s) needed to find the area of a surface of revolution (Q15, problems 1 - 6, 9). This problem will be connected to a problem from 7.2 - so you would have the same graph of the region.

• For Sec 7.6 - Average Value of a Function: Be able to set-up the integral needed to find the average value of a function over a given interval. You will likely be asked to also evaluate this integral (problems 3, 21a). A second part to this problem is also possible where you are asked to find $x^*$ on the interval such that $f(x^*) = f_{ave}$ (Q15, problems 1ab, 2ab).

• For Sec 8.8 - Improper Integrals: Be comfortable rewriting an improper integral in terms of limits - i.e. replace each discontinuity with a limit - do not evaluate (Q16, problems 3, 5, 11, 25, 27)

• For Sec 1.8 - Parametric Equations: Be comfortable sketching curves given in parametric form using either a table of values or by eliminating the parameter (Q16, problems 3, 5, 6, 7, 11). On a sketch make sure to clearly indicate the direction of motion. You may
be asked only to eliminate the parameter to get a rectangular (only in terms of $x$ and $y$) equation.

- For Sec 11.1 - Polar Coordinates: You need to know your transformation equations between rectangular and polar. You may be asked to convert either a point or the equation of a curve from polar to rectangular (Q18, problems 1, 9). You may instead be asked to convert the equation of a curve from rectangular to polar (problems 3, 11).

- For Sec 11.2 - Tangent Lines: You will only need to know how to find the slope ($\frac{dy}{dx}$) for parametric equations (Q18, problems 5, 6 only $\frac{dy}{dx}$).

- For Sec 11.4 - Conic Sections: You will be given the standard equations for translated conics Eq 12 - Eq 19 and be asked to write a general equation in standard form and identify the conic section (Q18, problems 7, 13, 19). This will involve completing the square for either the $x$ terms, the $y$ terms or both.

- There will be 8 - 10 questions on this exam. “One” question may consist of several multiple choice questions dealing mostly with properties of definite integrals or setting up integrals from Chapter 7.