What will be the Calc 2 final look like?

1	Topic: Definite Integration by Substitution Objective: Use substitution to integrate the function. The lower and upper bounds are always 0 and 1 for convenience. Examples: $$\int_0^1 \frac{x}{\sqrt[3]{x^2+8}} \; and \; \int_0^1 \frac{7x^6}{\sqrt[3]{x^7+1}} \; and \; \int_0^1 -9x^2(8-x^3)^4 dx$$ Strategy: Take the derivate of the function inside (e.g. radical and exponent), and then substitute the function with u, with removing the derivative on the outside. Consider this as a reverse chain rule.
2	Topic: Integration by Parts Objective: Use integration by parts to integrate the function. Examples: $$\int 4x\cos(8x) \; and \; \int x^2 \ln(x)$$ Strategy: Choose *u* then *dv* in this order: Logarithmic, Inverse, Algebraic, Trigonometric, Exponential. Then, use this formula: $udv = uv - \int(vdu)$. If you still have a product, use integration by parts again.
3	Topic: Areas between two Curves Objective: Find the area of the region enclosed by the graphs of two functions. These functions are no more than quadratic. Examples: ($y = 6 - x^2$, $y = -5x$) and ($y = 3 - x^2$, $y = -2x$) and ($y = 4 - x^2$, $y = -3x$) Strategy: Use the system of equations to find the integrand, the lower bound, and the upper bounds, then integrate.
4	Topic: Volumes by Revolution Objective: Find the volume of the solid obtained by rotating the region bounded by the graphs of: Examples: 1) $y = 13 - x$, $y = 5x + 7$, $x = -1$ 2) $y = 13 - x$, $y = 2x + 10$, $x = -5$ 3) $y = x^2 - 9$, $y = 0$ (rotates about the x-axis) Strategy: First, you should multiply the two products of each other. Then, use the system of equations to find the upper or lower bounds, and look at the graph, then integrate. The only difference after integrating is adding π.
5	Topic: Trigonometric Substitution Objective: Use trig substitution to integrate the function. Examples: $$\int \frac{1}{x^2\sqrt{16-x^2}} \; and \; \int \frac{\sqrt{x^2-16}}{x^4}$$ Strategy: You have to know all different trigonometric identities to successfully complete this problem. If you don't know how to approach this problem, just follow the examples you have done in class. And please, no math solvers.
6	Topic: Partial Fractions Objective: Decompose partial fractions in order to make integration more feasible. Examples: $$\int \frac{4x^2-4x+1}{x(x-1)^2} \; and \; \int \frac{8x+5}{x^2-3x+2} \; and \; \int \frac{5x^2-10x+8}{x(x-2)^2}$$ Strategy: Know your As, Bs, and/or Cs for decomposing partial functions. If that same term Example: (x-1) appears twice, make that a second power on the next term. Also, basic factoring is necessary to complete the problem.
7	Topic: Improper Integration Objective: Determine whether the integral is divergent or convergent. Examples: $$\int_{-6}^{\infty} e^{-3x} \; and \; \int_4^{\infty} e^{-2x} \; and \; \int_{-3}^{1} \frac{1}{\sqrt[5]{(x+3)^9}}$$ Strategy: An improper integral has one of the bounds that go to infinity and/or negative infinity. If an improper integral doesn't have bounds that go to infinity,

	identify the asymptotes. Also, please integrate anyways even if you are 100% sure that the integral would be divergent.
8	Topic: Comparison or Ratio Tests Objective: Apply the appropriate test to see if the series converges or diverges. Examples: $$\sum_{n=1}^{\infty}\left(\frac{n+3}{5n+4}\right)^n \ and \sum_{n=1}^{\infty}\frac{9}{7^n} \ and\ nd \sum_{n=1}^{\infty}\frac{4n}{7^n}$$ Strategy: Use the comparison test *most of the time*. If the function is exponential or has factorials, it would be helpful to use the ratio/root tests.
9	Topic: Alternating Series Objective: Use the alternating series test to determine whether the series converges absolutely, conditionally, or diverges. $$\sum_{n=1}^{\infty}(-1)^n\frac{1}{5n+1} and \sum_{n=1}^{\infty}\frac{4}{5^n+2} and \sum_{n=1}^{\infty}(-1)^n 15^{-n}$$ Strategy: Series like the harmonic series doesn't converge. You need to test two conditions for series convergence: $n > 0, so \frac{1}{n} > 0\ for\ all\ n$ and $lim_{n\to\infty}\frac{1}{n} > 0$. If the alternating series converges, use the absolute value to determine absolute or conditional convergence.
10	Topic: Power Series Objective: Find the center, radius of convergence and interval of convergence for the power series. Examples: $$\sum_{n=0}^{\infty}\frac{(x-2)^n}{n+9} and \sum_{n=1}^{\infty}\frac{(x+4)^n}{n*2^n} and \sum_{n=1}^{\infty}\frac{(x-3)^n}{n*7^n}$$ Strategy: Find the center by using the zero-product rule. Then, find the radius of convergence by using the ratio test. To determine the interval of the convergence, use the alternating series test for the left endpoint, and the integral test or comparison test for the right endpoint.
11	Topic: Taylor Polynomials / Series Objective: Find the Taylor polynomial of degree 2 or 3 for the functions: Examples: $e^{-x} + x$ centered at $a = -4\ and\ \sqrt{3+x^2}$ centered $at\ a = 1$ Strategy: Take derivatives repeatedly until you reach a certain degree. Then, substitute x for the appropriate value.