The following lists material that will be covered on Test 3. In addition to this list, review the WileyPLUS homeworks, the quizzes, and class notes. It is possible that a test question will touch on material that I have forgotten to list here. Also, due to time constraints, not all material listed here will appear on Test 3. Material that is listed but does not appear on Test 3 becomes a likely topic for the final exam.

1. 4.2: Inflection Points
   (a) Concavity of functions
   (b) If x is a point of inflection for f, then $f''(x) = 0$, but not every point x with $f''(x) = 0$ is a point of inflection.
2. 4.4: Profit, Revenue, and Cost (Applications of Global Min/Max)
   (a) Global Minimums, global maximums
   (b) Word optimization problems (e.g. a botanical garden with 3 sides of shrubs and 1 side of fencing)
   (c) Find critical points
   (d) Evaluate f at the critical points and check behavior of f at the endpoints
   (e) Profit is maximized when Marginal Revenue = Marginal Cost, or at the endpoints of the allowable production range.
3. 4.5: Average Cost
   (a) $a(q) = \frac{C(q)}{q}$
   (b) Graphical interpretation of average cost: $a(q)$ is the slope of line from the origin $(0, 0)$ to the point $(q, C(q))$ on the cost curve.
   (c) Average cost is minimized when Marginal Cost = Average Cost, or at the endpoints of the allowable production range.
4. 5.1: Distance and Accumulated Change
   (a) Graphical interpretation: given a rate of change $f'(t)$ (e.g. velocity), the total change in f over an interval $[a, b]$ (e.g. the distance traveled from time $t = a$ to time $t = b$) is given by the area under the graph of $f(t)$ between $t = a$ and $t = b$.
   (b) We can approximate areas with rectangles.
      i. The number of rectangles is n.
      ii. The width of each rectangle is Δt, and $\Delta t = \frac{b-a}{n}$.
      iii. The height of each rectangle is either taken from the left side of the rectangle (for a Left Hand Sum) or from the right side of the rectangle (for a Right Hand Sum).
      iv. The area under the curve is approximately the sum of the areas of the rectangles.
      v. The more rectangles (i.e. the larger n is and the smaller Δt is), the better the approximation.
      vi. The Left Hand Sum and the Right Hand Sum are examples of *Riemann sums*.
5. 5.2: The Definite Integral
   (a) The definite integral is the limit of Riemann sums.

   (b) Estimation of definite integrals using Riemann sums (Left Hand Sum and Right Hand Sum).
   (c) Know when a Riemann sum gives an upper bound or a lower bound on the definite integral. (Note: in some cases, we won't be able to tell.)

6. 5.3: The Definite Integral as Area
   (a) Interpretation of the definite integral as a signed area.
   (b) Regions below the x-axis contribute negatively, regions above contribute positively.

7. 5.4: Interpretations of the Definite Integral
   (a) Units of a definite integral.
   (b) Interpreting between definite integrals, areas of regions, and word problems.
   (c) See warm-up problems for some examples.

8. 5.5: Fundamental Theorem of Calculus
   (a) Know the Fundamental Theorem of Calculus.
   (b) FTC tells us that the definite integral of a rate of change equals the total change.

9. 7.1: Finding Antiderivatives Analytically
   (a) Antiderivatives
   (b) The indefinite integral
   (c) Basic integration rules
      i. $\int k\,dx = kx + C$
      ii. If $n \neq 1$, then $\int x^n\,dx = \frac{x^{n+1}}{n+1}$.
      iii. Sum and constant multiple rules: $\int f(x) + g(x)\,dx = \int f(x)\,dx + \int g(x)\,dx$ and $\int cf(x)\,dx = c\int f(x)\,dx$ where c is a constant.
      iv. $\int \frac{1}{x}\,dx = \ln|x| + C$
      v. If $k \neq 0$, then $\int e^{kx}\,dx = \frac{1}{k}e^{kx} + C$.

10. 7.2: Integration by Substitution
   (a) Use substitution to evaluate indefinite integrals

11. 7.3: Using FTC to find Definite Integrals
   (a) Use FTC and antiderivatives to find the value of definite integrals
   (b) Definite integrals and substitution