Name________________________________Period __________ Date_______________

2:28 Summary of Integration and Differentiation (M-22)

1. A pure exponential function is identical to its own derivative.
   If $y = e^x$ then $dy/dx =$ ___________ and $\int y\,dx =$ ___________ + C,
   where "C" can have any constant value.

2. Differentiating a pure sinusoidal curve shifts it by ___________ cycle to the ___________.
   If $y = \sin x$ then $dy/dx =$ ___________.
   Integrating a sinusoidal function shifts it by ___________ cycle to the ___________.
   If $Y =$ _______________ then $\int Y\,dx = \sin x + C$.

3. Differentiating a polynomial term causes its exponent to___________crease by___________
   and causes its coefficient to be ____________________ by the ________________________.
   If $y = k\,x^n$ then $dy/dx =$ ______________________.

4. Integration is the ______________________of differentiation. Integrating a polynomial term causes its exponent to ____crease by ___ and causes its coefficient to be ________________ by the ____.

   For example, if $y = k\,x^n$ then $\int y\,dx =$ _________________________________ + C.

5. "Nested" functions can be differentiated with the *chain rule*:

   If $y = f[g(x)]$ then $dy/dx = (df/dg)(dg/dx)$.

   For example, if $y = A\,e^{kx}$ then $dy/dx =$ ______________________.

   Differentiating a generalized exponential causes its coefficient to be multiplied by the _______________factor in its exponent. (variable, constant)

6. Integrating a generalized exponential function causes its coefficient to be ________________
   by the _______________ factor in its exponent:
   For example, if $y = A\,e^{kx}$ then $\int y\,dx =$ ______________________ + C.

7. If $y = A \sin \omega t$ then (using the chain rule)

   $dy/dt =$ ________________ and $\int y\,dx =$ ________________________ + C.

   If $y = A \cos \omega t$ then $\int y\,dx =$ ______________ + C, and $dy/dt =$ _________________.

8. Product rule:
   If f and g are two functions of x, and f' and g' are their derivatives,
   then the derivative of their product is ______________________.