Name: ____ Date: ____________ IB Math A&A SL

Lesson 3.3 - Continuous Compounding & the value 'e'

I. Warm-Up – Martha Stewart deposits \$1 in an account at a very generous bank that pays her 100% interest. Assuming no other deposits and withdrawals, what will her balance be in one year if the interest is compounded:

(a). Quarterly (b). Monthly (c). Daily

d. What do you notice? Can you write a function that gives you the balance after *n* compoundings in 1 year?

e. **Key Idea** – Will Martha's ending balance ever exceed \$3?

II. The Value 'e' =

2. Sketch a graph of $y = e^x$.

3. One the same graph, sketch a graph of $y = 3e^x + 1$.

4. Evaluate the following functions at the indicated values: (Using your calculator)

(a). $y = e^x$ at $x = 3.2$ (b). $y = 1.5e^{\frac{x}{2}}$ at $x = 24$ (c).$y = 250e^{0.05x}$ at $x = 20$

III. Continuous Compound Interest

Normal Compound Interest Formula	Continuous Compounding Interest Formula

5. How much will a $100 deposit earning 6% interest, compounded monthly, yield in 5 years?

6. How much will a $100 deposit earning 6% interest, compounded continuously, yield in 5 years?

7. Boruto's dad creates a trust fund for Boruto when he is born and deposits 10,000 両 (ryo). The trust fund pays 9% interest compounded continuously. Determine the balance of this account when Boruto goes to college at the age of 18.

8. The population P (in mllions) of Russia from 1996 to 2004 can be approximated by the model $P = 152.26e^{-0.0039t}$, where t represents the year and $t = 6$ corresponding to 1996.

   a. According to the model, is the population of Russia increasing or decreasing? Explain.

   b. Find the population of Russia in the year 1998.

   c. Find the population of Russia in the year 2001.

IV. Looking Ahead – Suppose I had an initial deposit of $10,000. When does my balance reach $1,000,000 at an annual compounding of 5% interest rate?