Math 105 TOPICS IN MATHEMATICS

SOLUTION FOR QUIZ – IV (02/20)

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⋆ In problem [I] below we work on a model where one can divide any dollar amount by any large number (integer). Also, we never round figures. So, one-third of a dollar is never the same as 33 cents (because 33 cents is one-third of 99 cents).

[I] (14pts) You open a bank account, deposit a dollar in that account.

(1) Your bank offers 100 percent interest annually.

After one year, your balance is \$ 2.

(2) Suppose your bank offers a compound interest with 100 percent rate annually.

After two years, your balance is \$ 4.

(3) Suppose the compounding takes place semi-annually. So every half-year the 50 percent of your balance will be accrued as an interest.

After one year, your balance is \$ 2.25.

(4) Suppose the compounding takes place 12 times annually. So every month $\left(= \frac{1}{12}\text{-th of a year} \right)$, $\frac{1}{12}$ times 100 percent of your balance will be accrued as an interest.

After one year, your balance is \$ $\left(1 + \frac{1}{\boxed{12}} \right)^{\boxed{12}}$.

(5) Suppose the compounding takes place 10^{20} times annually. So every $\dfrac{1}{10^{20}}$-th of a year, $\dfrac{1}{10^{20}}$ times 100 percent of your balance will be accrued as an interest.

After one year, your balance is \$ $\left(1 + \dfrac{1}{\boxed{10^{20}}}\right)^{\boxed{10^{20}}}$.

(6) Is your answer in (5) more than or less than \$2?

[Answer]: It is more than \$ 2.

(7) Is your answer in (5) more than or less than \$3?

[Answer]: It is less than \$ 3.

[II] (6pts)

(1) $3! = \boxed{3} \cdot \boxed{2} \cdot \boxed{1} = 6.$

(2) $5! = \boxed{5} \cdot \boxed{4} \cdot \boxed{3} \cdot \boxed{2} \cdot \boxed{1} = 120.$