

MATH 127 Quiz 3 Solutions DRAFT

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1. On the one hand, Bob has doubled his money, so he has \$2000. On the other hand, he has earned compound interest i for 10 years, resulting in the amount $1000(1+i)^{10}$. This gives us the equation

$$2000 = 1000(1+i)^{10} \implies 2 = (1+i)^{10} \implies 2^{1/10} = 1+i \implies i = 2^{1/10} - 1.$$

Pressing the correct sequence of buttons on your calculator should give $i = 0.07177$ or 7.177%.

2. The first phase of the problem is an ordinary annuity starting on the month before Alice's 20th birthday and ending at her 30th birthday, so $n = 10 \times 12 + 1$, $i = 0.075/12 = 0.00625$, $R = 100$, and we have

$$A = R \left(\frac{(1+i)^n - 1}{(1+i) - 1} \right) = 100 \left(\frac{1.00625^{121} - 1}{0.00625} \right) = 18004.24.$$

That amount then accumulates compound interest for 35 years, so $n = 35 \times 12 = 420$, $i = 0.075/12 = 0.00625$, $P = 18004.24$, giving a final amount of

$$A = P(1+i)^n = 18004(1.00625)^{420} = 246518.78.$$

What would Alice have at retirement if she had been able to earn 10% interest instead of 7%?