At the end of each quarter, a 50 year old woman puts $3000 in a retirement account that pays 5% interest compounded quarterly. When she reaches 60, she withdraws the entire amount and places it in an account that pays 6.9% interest compounded monthly. From there on she deposits $300 in a mutual fund at the end of each month. How much is in the account when she reaches age 65?

Deposit $3000 each quarter in an account earning 5% annually that is compounded quarterly for 10 years.

Ordinary Annuity

Since regular payments are made each quarter at the end of the quarter, this is an ordinary annuity.

$$PMT = 3000$$
$$i = \frac{0.05}{4} = 0.0125$$
$$n = 10 \cdot 4$$

$$FV = PMT\left[\frac{(1+i)^n - 1}{i}\right]$$

$$= 3000\left[\frac{1.0125^{40} - 1}{0.0125}\right]$$

$$\approx 154,468.67$$

154,468.67

Deposit the future value in an account earning 5% annually that is compounded quarterly for 5 years

Future value grows according to compound interest

$$PV = 154468.67$$
$$i = \frac{0.069}{12} = 0.00575$$
$$n = 5 \cdot 12$$

Compound Interest

$$FV = PV(1+i)^n$$

$$= 154468.67(1.00575)^{60}$$

$$\approx 217,892.80$$

Deposit $3000 each quarter in an account earning 5% annually that is compounded quarterly for 10 years.

Regular payments are made each month at the end of the month so this is an ordinary annuity.

$$PMT = 300$$
$$i = \frac{0.069}{12} = 0.00575$$
$$n = 5 \cdot 12$$

Ordinary Annuity

$$FV = PMT\left[\frac{(1+i)^n - 1}{i}\right]$$

$$= 300\left[\frac{1.00575^{60} - 1}{0.00575}\right]$$

$$\approx 21,422.37$$

217,892.80

21,422.37

$$217,892.80 + 21,422.37 = 239,315.17$$