

## Math 111 Finance Worksheet C

Much has been written about the importance of investing early and often. Two friends saved for retirement over a 40-year period in two different ways. Johnny on the Spot invested \$4,000 per year at 8% annual interest for the first twenty years, then invested nothing over the last 20 years. During the last 20 years, his investments accumulated interest at 9% annual interest. Johnny Come Lately invested nothing for the first twenty years, but then invested \$10,000 per year over the next 20 years at 9% annual interest.

- (a) How much did Johnny on the Spot invest over the 40-year period?  $\$80,000$
- (b) How much did Johnny Come Lately invest over the 40-year period?  $\$200,000$
- (c) How much did Johnny on the Spot accumulate over the 40-year period? After 20 yrs:  $\$183,047.86$   
After 40 yrs:  $\$1,025,875.40$
- (d) How much did Johnny Come Lately accumulate over the 40-year period? After 20 yrs:  $0$   
After 40 yrs:  $\$511,601.20$
- (e) Who was the wiser investor and why?

### Explorations:

1. Compare the future values of the two Johnnys in the scenario below. Johnny on the Spot begins investing at age 25 and invests \$3,000 for 30 years. From age 55 to age 65, he invests no additional funds. Johnny Come Lately begins investing at age 30 and invests \$3,000 for 30 years. From age 60 to age 65, he invests no additional funds. What are the implications of waiting just 5 years to begin investing? Assume an 8% annual interest rate throughout the 40 years.

	Johnny on the Spot	Johnny Come Lately
Age at first Investment	25	30
Number of years investing	40	35
Annual Investment	3000	3000
APR	8	8
Total Amount Invested	90000	90000
Future Value at Age 65	233,709.86	499,750.60

2. Compare the future values of the two Johnnys in the scenario below. Johnny on the Spot begins investing at age 20 and invests \$3000 for 45 years. Johnny Come Lately begins investing at age 40 and invests \$10,000 for 25 years. What are the implications of delayed investing? Assume an 8% annual interest rate throughout the 45 years.

	Johnny on the Spot	Johnny Come Lately
Age at first Investment	20	40
Number of years until age 65	45	25
Annual Investment	3000	10000
APR	8	8
Total Amount Invested	135000	250000
Future Value at Age 65	1,159,516.85	731,059.40

3. Compare the future values of the two Johnnys in the scenario below. Johnny on the Spot begins investing at age 20 and invests \$3,000 for 25 years. From age 45 to age 65, he invests no additional funds. Johnny Come Lately begins investing at age 40 and invests for 25 years. What are the implications of delayed investing? Assume an 8% annual interest rate throughout the 45 years.

	Johnny on the Spot	Johnny Come Lately
Age at first Investment	20	40
Number of years until age 65 (invests only first 25 years)	45	25
Annual Investment	3000	14000
APR	8	8
Total Amount Invested	75000	350000
Future Value at Age 65	1,022,220.96	1,023,483.16

4. In the first scenario above where Johnny on the Spot accumulates \$1,025,875.40, how much would Johnny Come Lately have to invest each year during the 20-year period to accumulate the same amount as Johnny on the Spot after 40 years?

Lately invests  $\$22,417.65$