

APPROXIMATING INSTANTANEOUS RATE OF CHANGE (IROC)

1. Below is a table of fatal car crashes by year in the U.S.

Year	2013	2012	2011	2010	2009
# Fatal Crashes	30,057	31,006	29,867	30,296	30,862

- a. Find the AROC from 2011 to 2012.

- b. Find the AROC from 2012 to 2013.

- c. Use the AROCs from a & b to approximate the IROC in 2012.

2. Before Russell Wilson played for the NFL, he played 4 years of college football (as a QB) at NC State and Wisconsin (Wikipedia). A table of his passing yards during college football per year is below.

Year	2008	2009	2010	2011
Passing yards	1,955	3,027	3,563	3,175

- a. Calculate Russell's AROC from 2011 to 2008 and his approximated IROC in 2009.

- b. Is the AROC or IROC greater? Explain.

3. Total electric car sales by year (electricdrive.org)

Year	2015	2014	2013	2012	2011	2010
# total electric cars sold	416,941	570,475	592,232	487,480	284,064	274,555

- a. Approximate the IROC in 2014.

- b. Calculate the AROC over the last 5 years.

- c. Explain the difference between the 2014 IROC to the AROC from 2010 to 2015.

4. The number of health records breaches from 2010 to 2015 in the U.S. is given in millions in the table below (Forbes).

# breaches (million)	6	12	3	9	11	80
Year	2010	2011	2012	2013	2014	2015

- a. What is the AROC of health record breaches over the last five years?

- b. Approximate the IROC in 2011.

5. The table below shows the estimated Oregon population (PSU). Approximate the IROC in 2014.

Pop	4,013,845	3,962,710	3,919,020	3,883,735	3,857,625	3,837,300
Year	2015	2014	2013	2012	2011	2010

6. Data for Black Friday injury count is listed in the table below (blackfridaydeathcount.com).

# Injuries	5	15	11	46	2	1	6
Year	2014	2013	2012	2011	2010	2009	2008

a. Find the AROC from 2008 to 2011.

b. Approximate the IROC in 2011.

c. Compare the AROC to IROC. Explain your findings.

7. The table below lists estimated median annual income (\$) for full-time, year round employed individuals aged 25-34 years old based on degree earned (nces.ed.gov).

Bachelors	50,000	51,000	52,000	51,000	54,000	54,000	54,000	52,000	53,000
Associates	38,000	36,000	38,000	40,000	39,500	39,500	39,500	40,000	40,500
High School Diploma	30,000	31,000	31,500	31,700	32,000	32,000	33,000	33,000	33,000
No degree/diploma	24,000	24,000	24,500	22,000	22,000	23,000	25,000	22,000	25,000
Year	2013	2012	2011	2010	2009	2008	2007	2006	2005

a. Find the IROC in 2009 for each category of degree earned.

b. Which category has the highest IROC?

c. Which category has the lowest AROC?