Adv Alg

Name: _____

Date: _____Pd_____

AROC Practice (CPM)

9-4. As the Shuttle mission STS-82 lifted off from the NASA launching pad at Cape Canaveral, Mission Control in Houston was receiving the following data about the height of the rocket in feet.

Time (in seconds)	3	6	9	12	15	18	21
Height (in feet)	70	297	701	1306	2131	3200	4533

Find the rocket's average velocity at different times by calculating $\frac{\text{change in distance}}{\text{change in time}} = \frac{\Delta d}{\Delta t}$ for the intervals given in the following table.

Note that the Greek capital letter delta (Δ) in the previous formula means "change in."

a. From $t = 3$ to $t = 21$.

b. From $t = 3$ to $t = 18$.

c. From $t = 3$ to $t = 15$.

d. From $t = 3$ to $t = 12$.

e. From $t = 3$ to $t = 9$.

f. From $t = 3$ to $t = 6$.

9-5. A weather balloon is sent up to measure the air pressure, temperature, and dew point at a particular location. It radios back the following information:

Time (s)	Altitude (ft)	Pressure (mb)	Temp ° C	Dew Pt ° C
0	ground level	1000	17.8	9
360	2900	925	25.6	4
650	4900	850	22.2	2
1400	9900	700	13	–13
2750	19900	500	–4.1	–26
3600	24900	400	–17.9	–37

a. How fast is the balloon ascending from $t = 360$ s to $t = 650$ s? $\left(\frac{\Delta A}{\Delta t}\right)$

Be sure to include the units (ft/s).

b. What is the average rate of change of the pressure with respect to time from $t = 650$ s to $t = 2750$ s? $\left(\frac{\Delta P}{\Delta t}\right)$

c. What does the negative sign mean in part (b)?

d. How is the temperature changing with respect to the altitude from $t = 0$ s to $t = 3600$ s? $\left(\frac{\Delta \text{temp}}{\Delta A}\right)$

9-11. Suppose you want to buy rice. Different size packages cost different amounts, but the relationship is not always linear. That is, a bag twice as big does not usually cost twice as much. The chart shows the prices for various sizes of bags of rice.

1/2 lb bag	$0.89
1 lb bag	$1.29
2 lb bag	$1.89
5 lb bag	$4.60
10 lb bag	$8.95
20 lb bag	$17.80

a. Find the rates in cost per pound. (Stores refer to this as unit pricing.)

b. Does the unit price increase or decrease with the size of the bag?

c. Does the rate change more drastically for smaller sizes or for larger sizes?

9-17. The table below shows the population of Australia for the given years.

Year	Population (millions)	Year	Population (millions)	Year	Population (millions)
1970	12.51	1987	16.10	1997	18.52
1973	13.27	1989	16.83	1999	18.94
1977	14.07	1991	16.85	2002	19.66
1981	14.57	1992	17.07	2004	20.10
1986	15.61	1996	18.06	2007	20.74

a. Enter the data above into your calculator. Create a plot of the data and find an equation to model this data.

b. If the population growth of Australia continues in this pattern, what population can they expect in the year 2020?

c. From the table, what was the average rate of growth $\left(\frac{\Delta p}{\Delta t}\right)$ between 1970 and 1999?

d. Using your model, what will be the average rate of growth $\left(\frac{\Delta p}{\Delta t}\right)$ between 1999 and 2020?

e. When is the growth increasing most rapidly?

9-31. A toy car travels a distance $10t^2$ feet in the first t seconds after it starts. Calculate the average velocity of the car on these intervals by calculating the change in distance divided by the change in time.

a. $[3, 4]$

b. $[3, 3.1]$

c. $[3, 3.01]$

d. $[3, 3.001]$

e. $[2.99, 3]$

f. $[2.999, 3]$

9-36. For each of the following functions, is the average rate of change over the given interval positive or negative? Try to do this without substituting the values.

a. $f(x) = x^2$ over the interval $[2, 3]$.

b. $g(x) = \log x$ over the interval $[0.01, 1]$.

c. $h(x) = 7 - 3x^2$ over the interval $[2, 5]$.

d. $j(x) = 0.5^x$ over the interval $[-1, 0]$.

e. $k(x) = 1.5^x$ over the interval $[-1, 0]$.

f. $m(x) = x^2$ over the interval $[-2, 3]$.