ANSWERS => Rate of Change Review #2

1. At 5 am Mr. Bishop's odometer read 44 520 Km.

$\hookrightarrow (5, 44\,520)^{x_1\,y_1}$

At 11 am Mr. Bishop's odometer read 45 000 Km.

$\hookrightarrow (11, 45\,000)^{x_2\,y_2}$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{45\,000 - 44\,520}{11 - 5}$$
$$= \frac{480}{6}$$
$$= 80 \text{ Km/h}$$

Mr. Bishop's average speed for the trip was 80 Km/h.

2. $h = -4.9t^2 + 29.4t + 1$

a)
① $h - 1 = -4.9t^2 + 29.4t$
② $h - 1 = -4.9(t^2 - 6t)$
③ $h - 1 - 44.1 = -4.9(t^2 - 6t + 9)$
$h - 45.1 = -4.9(t-3)^2$
$h = -4.9(t-3)^2 + 45.1$

Vertex $(3, 45.1)$

The ball reaches a maximum height of 45.1 m after 3 seconds.

b) $h = -4.9t^2 + 29.4t + 1$

When $t = 2$
$h = -4.9(2)^2 + 29.4(2) + 1$
$= -4.9(4) + 58.8 + 1$
$= -19.6 + 58.8 + 1$
$= 40.2 \text{ m}$

When $t = 5$
$h = -4.9(5)^2 + 29.4(5) + 1$
$= -4.9(25) + 147 + 1$
$= -122.5 + 147 + 1$
$= 25.5 \text{ m}$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{25.5 - 40.2}{5 - 2}$$
$$= \frac{-14.7}{3}$$
$$= -4.9 \text{ m/s}$$

c) $h = -4.9t^2 + 29.4t + 1$

When $t = 2.9$
$h = -4.9(2.9)^2 + 29.4(2.9) + 1$
$= -4.9(8.41) + 85.26 + 1$
$= -41.209 + 85.26 + 1$
$= 45.051 \text{ m}$ $(2.9, 45.051)$
                        $x_1\,y_1$

When $t = 3.1$
$h = -4.9(3.1)^2 + 29.4(3.1) + 1$
$= -4.9(9.61) + 91.14 + 1$
$= -47.089 + 91.14 + 1$
$= 45.051 \text{ m}$
$(3.1, 45.051)$
  $x_2\,y_2$

$$IROC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{45.051 - 45.051}{3.1 - 2.9}$$
$$= \frac{0}{0.2}$$
$$= 0 \text{ m/s}$$

3.* All trips begin at $(0,0)$ (x_1,y_1)
Trip finished at $(4,295)$ (x_2,y_2)

$AROC = \dfrac{y_2-y_1}{x_2-x_1}$

$= \dfrac{295-0}{4-0}$

$= \dfrac{295}{4}$

$= 73.75$ Km/h.

b) At $t=2$, $(2,155)$
At $t=4$, $(4,295)$

$AROC = \dfrac{y_2-y_1}{x_2-x_1}$

$= \dfrac{295-155}{4-2}$

$= \dfrac{140}{2}$

$= 70$ Km/h

c) At $t=0$, $(0,0)$
At $t=3$, $(3,235)$

$AROC = \dfrac{y_2-y_1}{x_2-x_1}$

$= \dfrac{235-0}{3-0}$

$= \dfrac{235}{3}$

$= 78.\overline{3}$ Km/h

4. The graph is increasing from:

1961 − 1968
1972 − 1975
1978 − 1980
1985 − 1990

The graph is decreasing from:

1960 − 1961
1968 − 1972
1975 − 1978
1980 − 1985