SOLUTIONS => RATE OF CHANGE EXAM REVIEW

1- Constant Rate of Change => Straight line

- Non-Constant Rate of Change => Curved line
  * for example. PARABOLA
- Instantaneous Rate of Change will be equal to zero at the vertex.

2.

a) $(2, 155)$ (x_1, y_1)

$(6, 255)$ (x_2, y_2)

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

$$= \frac{255 - 155}{6 - 2}$$

$$= \frac{100}{4}$$

$$= 25 \text{ bacteria/cm}^2\text{/hr}$$

b) First 3 hours:

$(0, 100)$ (x_1, y_1)

$(3, 160)$ (x_2, y_2)

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

$$= \frac{160 - 100}{3 - 0}$$

$$= \frac{60}{3}$$

$$= 20 \text{ bacteria/cm}^2\text{/hr}$$

c) First 5 hours:

$(\underset{x_1}{0}, \underset{y_1}{100})$

$(\underset{x_2}{5}, \underset{y_2}{250})$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{250 - 100}{5 - 0}$$
$$= \frac{150}{5}$$
$$= 30 \text{ bacteria/cm}^2\text{/hr}$$

d) $(\underset{x_1}{1}, \underset{y_1}{140})$

$(\underset{x_2}{5}, \underset{y_2}{250})$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{250 - 140}{5 - 1}$$
$$= \frac{110}{4}$$
$$= 27.5 \text{ bacteria/cm}^2\text{/hr}$$

3.

a) Positive Rate of Change => A to B.

b) Negative Rate of Change => B to C

c) Zero

4. $y = -0.25x^2 + 6x - 2$

$x = 3.9$

$y = -0.25(3.9)^2 + 6(3.9) - 2$

$y = -0.25(15.21) + 23.4 - 2$

$y = -3.8025 + 23.4 - 2$

$y = 17.5975$ $\quad (3.9, 17.5975)$ x_1, y_1

$x = 4.1$

$y = -0.25(4.1)^2 + 6(4.1) - 2$

$y = -0.25(16.81) + 24.6 - 2$

$y = -4.2025 + 24.6 - 2$

$y = 18.3975$ $\quad (4.1, 18.3975)$ x_2, y_2

$$IROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{18.3975 - 17.5975}{4.1 - 3.9}$$

$$= \frac{0.8}{0.2}$$

$$= 4$$

5a) Sam was travelling at a constant speed for the first 6 hours. (0 to 6)

His speed was zero for the last 4 hours. (6 to 10)

b) Average Speed for Entire Trip.

$(0,0)$ $(10,10)$

$x_1\ y_1$ $x_2\ y_2$

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

$$= \frac{10-0}{10-0}$$

$$= \frac{10}{10}$$

$$= 1 \text{ m/h}$$

6. $h = -4.9t^2 + 29t + 1$

a) $t = 1$

$h = -4.9(1)^2 + 29(1) + 1$
$h = -4.9(1) + 29 + 1$
$h = -4.9 + 29 + 1$
$h = 25.1$
$(1, 25.1)$

$t = 2.5$

$h = -4.9(2.5)^2 + 29(2.5) + 1$
$h = -4.9(6.25) + 72.5 + 1$
$h = -30.625 + 72.5 + 1$
$h = 42.875$
$(2.5, 42.875)$

b) $AROC = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{42.875 - 25.1}{2.5 - 1}$

$= \frac{17.775}{1.5}$

$= 11.85$ m/s

The ball is rising between 1 and 2.5 seconds.

c) $t = 1.9$

$h = -4.9(1.9)^2 + 29(1.9) + 1$
$h = -4.9(3.61) + 55.1 + 1$
$h = -17.689 + 55.1 + 1$
$h = 38.411$ $\quad (1.9, 38.411)$

$t = 2.1$

$h = -4.9(2.1)^2 + 29(2.1) + 1$
$h = -4.9(4.41) + 60.9 + 1$
$h = -21.609 + 60.9 + 1$
$h = 40.291$ $\quad (2.1, 40.291)$

$$\text{IROC} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{40.291 - 38.411}{2.1 - 1.9}$$
$$= \frac{1.88}{0.2}$$
$$= 9.4 \text{ m/s}$$