

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.

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a) $(2, 155)$
 $(6, 255)$
 x_1, y_1
 x_2, y_2

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

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

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

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

b) First 3 hours:
 $(0, 100)$
 $(3, 160)$
 x_1, y_1
 x_2, y_2

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

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

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

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

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c) First 5 hours:

$(0, 100)$
 $(5, 250)$
 x_1, y_1
 x_2, y_2

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

$$= \frac{250 - 100}{5 - 0}$$

$$= \frac{150}{5}$$

$$= 30 \text{ bacteria/cm}^2/\text{hr}$$

d) $(1, 140)$
 $(5, 250)$
 x_1, y_1
 x_2, y_2

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

$$= \frac{250 - 140}{5 - 1}$$

$$= \frac{110}{4}$$

$$= 27.5 \text{ bacteria/cm}^2/\text{hr}$$

3.

- a) Positive Rate of Change => A to B.
 b) Negative Rate of Change => B to C
 c) zero

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

$x = 3.9$
 $y = -0.25(3.9)^2 + 6(3.9) - 2$
 $y = -0.25(15.21) + 23.4 - 2$
 $y = -3.8025 + 23.4 - 2$
 $y = 17.5975$
 $(3.9, 17.5975)$
 x_1, y_1

$x = 4.1$
 $y = -0.25(4.1)^2 + 6(4.1) - 2$
 $y = -0.25(16.81) + 24.6 - 2$
 $y = -4.2025 + 24.6 - 2$
 $y = 18.3975$
 $(4.1, 18.3975)$
 x_2, y_2

$\text{AROC} = \frac{y_2 - y_1}{x_2 - x_1}$
 $= \frac{18.3975 - 17.5975}{4.1 - 3.9}$
 $= \frac{0.8}{0.2}$
 $= 4$

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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

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

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

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

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

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

a) $t = 1$ $t = 0.5$

$h = -4.9(1)^2 + 29(1) + 1$ $h = -4.9(0.5)^2 + 29(0.5) + 1$
 $h = -4.9(1) + 29 + 1$ $h = -4.9(0.25) + 14.5 + 1$
 $h = -4.9 + 29 + 1$ $h = -30.625 + 14.5 + 1$
 $h = 25.1$ $h = 42.875$
 $(1, 25.1)$ $(0.5, 42.875)$

b) $\text{AROC} = \frac{y_2 - y_1}{x_2 - x_1}$ $\text{The ball is rising between 1 and 0.5 seconds.}$

$$= \frac{42.875 - 25.1}{0.5 - 1}$$

$$= \frac{17.775}{-0.5}$$

$$= -35.55 \text{ m/s}$$

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$$c) t=1.9$$

$$h = -4.9(1.9)^2 + 29(1.9) + 1$$

$$h = -4.9(3.61) + 55.1 + 1$$

$$h = -17.689 + 55.1 + 1$$

$$h = 38.411 \quad (1.9, 38.411)$$

$$t = 2.1$$

$$h = -4.9(2.1)^2 + 29(2.1) + 1$$

$$h = -4.9(4.41) + 60.9 + 1$$

$$h = -21.609 + 60.9 + 1$$

$$h = 40.291 \quad (2.1, 40.291)$$

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

$$= \frac{40.291 - 38.411}{2.1 - 1.9}$$

$$= \frac{1.88}{0.2}$$

$$= 9.4 \text{ m/s}$$

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