

1) $R(t) = 5\sqrt{t} \cos\left(\frac{t}{5}\right)$

a) $R(6) = 4.438 > 0$, The number of mosquitoes is increasing.

b) $R'(6) = -1.913 < 0$, The number of mosquitoes is increasing at a decreasing rate.

c) $1000 + \int_0^{31} R(t) dt = 964.335$

At $t=31$, 964 mosquitoes will be on Tropical Island.

d) max occurs @ endpoints or critical points

endpoints

$t = 0$

$t = 31$

critical pts

$R(t) = 0 \leftarrow \text{USE CALCULATOR} \rightarrow \text{FIND ZEROS}$

$t = 7.853 \rightarrow A$

$t = 23.562 \rightarrow B$

t	# of mosquitoes
0	1000
A	$1000 + \int_0^A R(t) dt = 1039$
B	$1000 + \int_0^B R(t) dt = 842$
31	964

Max # of mosquitoes is 1039

$$2) P'(t) = 1 - 3e^{-0.2\sqrt{t}}$$

$$a) P'(9) = -0.646 < 0$$

At $t=9$, the amount of pollutant is decreasing.

$$b) P'(t) = 0 \text{ @ } t = 30.174$$

Pollutant is a min @ $t=30.174$ days because $P'(t)$ changes signs from $-$ to $+$.

$$c) P(30.174) = 50 + \int_0^{30.174} P'(t) dt$$

$$= 35.104 < 40$$

The lake is safe...
go for a swim!!

d) Tangent Line

$$P(0) = 50 \quad P'(0) = -2$$

TO BE SAFE:

$$y - 50 = -2(t - 0)$$

$$50 - 2t = 40$$

$$-2t = -10$$

$$t = 5$$

$$L(t) = 50 - 2t$$

By day 5, the lake is safe.