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Help

Course > Section 5: Population Dynamics Part I: the Evolution of Population Models > 1.6 Summary Quiz: Population Models > 1.6.1 Summary Quiz: A General Predator-Prey Phase Plane

# 1.6.1 Summary Quiz: A General Predator-Prey Phase Plane

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### Question 1

1/1 point (graded)

Let's look at the general predator prey system with constants  ${f a},{f b},{f c},{f d}>0$  and

$$rac{dS}{dt} = \mathbf{a}S - \mathbf{b}SM$$

$$rac{dM}{dt} = -\mathbf{c}M + \mathbf{d}SM$$

There are two nullclines on which  $rac{dM}{dt}=0$ . One of these is the line M=0. What is the equation of the other line?

$$\circ$$
  $S=0$ 

$$S = \frac{\mathbf{a}}{\mathbf{b}}$$

• 
$$S = \frac{\mathbf{c}}{\mathbf{d}} \checkmark$$

$$M = \frac{\mathbf{a}}{\mathbf{b}}$$

$$M = \frac{\mathbf{c}}{\mathbf{d}}$$

None of the above.

#### **Explanation**

Factoring  $rac{dM}{dt}$  we get  $rac{dM}{dt}=0$  if M=0 or  $(-\mathbf{c}+\mathbf{d}S)=0$ . Thus the other nullcline equation is  $S = \frac{\mathbf{c}}{\mathbf{d}}$ .

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You have used 1 of 3 attempts

Answers are displayed within the problem

#### Question 2

1/1 point (graded)

Let's look at the general predator prey system with constants a,b,c,d>0 and

$$rac{dS}{dt} = \mathbf{a}S - \mathbf{b}SM$$

$$rac{dM}{dt} = -\mathbf{c}M + \mathbf{d}SM$$

There is one equilibrium point at (0,0) (meaning no sardines and no marlin). There is one other equilibrium point. What is it?

- $\circ$  (c/d, 0)
- $(0, (\mathbf{a}/\mathbf{b})$
- $\bigcirc$  (a/b, c/d)
- None of the above.

#### **Explanation**

The other equilibrium point is  $(\mathbf{c}/\mathbf{d}, \mathbf{a}/\mathbf{b})$ . We can solve for these by finding where  $\frac{dS}{dt}$ and  $rac{dM}{dt}$  are both zero. This the same as finding the points at which the nullclines for Sintersect the nullclines for M.)

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You have used 2 of 3 attempts

Answers are displayed within the problem

## Question 3

1/1 point (graded)

The nullcline you found above is separated into two parts by a nullcline on which  $\frac{dS}{dt}=0$ . On the part of the  $rac{dM}{dt}$  nullcline closest to the  $m{S}$  axis, how is the value of  $m{S}$  changing with time? (Hint: Think about values of M very close to 0.)

lacksquare S is constant.

lacksquare is decreasing.

#### **Explanation**

S is increasing, and if Mpprox 0, then  $rac{dS}{dt}pprox {f a}S$  so the population of sardine would be increasing almost exponentially.

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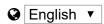
You have used 1 of 1 attempt

**1** Answers are displayed within the problem

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