

QUIZ 4

1) A population of birds after t years is given by
 $P(t) = 10t^2 - 4t + 700$.

A. What is the rate of change of the population after 3 years?

B. At what time is the population increasing at a rate of 46 birds/year?

A) Rate of change = derivative

$$P'(t) = 20t - 4$$

$$P'(3) = 20(3) - 4 = \boxed{56 \text{ birds/yr}}$$

$$B) P'(t) = 20t - 4 = 46 \text{ birds/yr}$$

$$\Rightarrow 20t = 50, \quad |t = 2.5 \text{ years}|$$

2) Find the derivative of $y = e^x(3\cos(x) + 4x^2)$.

Product rule

$$y' = e^x(3\cos(x) + 4x^2) + e^x(-3\sin(x) + 8x)$$

$$= e^x(3\cos(x) + 4x^2 - 3\sin(x) + 8x)$$