Mathematics 122

Quiz 4 Name: Key

You must show your work to get full credit.

1. Let $P(t)$ have exponential growth with $P(0) = 50$ and $P(2) = 200$. Give a formula for $P(t)$

$P(t) = P(0)a^t = 50a^t$

To find a solve

$P(2) = 50a^2 = 200$

$a^2 = \frac{200}{50} = 4$

$a = 4^{(1/2)} = 2.$

$P(t) =$ $50\,(2)^t$

2. Solve $2e^{2t} = 4$.

$e^{2t} = \frac{4}{2} = 2$

$2t = \ln(2)$

$t = \ln(2)/2 = .34657$

$t =$ .34657

3. If \$1,000 is invested at 15% simple interest, then the principal after t years is

$$P(t) = 1{,}000(1.15)^t.$$

(a) What is the principal after 5 years?

Just plug in

$P(5) = 1000(1.15)^5 = 2011.36$

$P(5) =$ \$ 2011.36

(b) How long until the principal reaches \$10,000?

Solve

$1{,}000(1.15)^t = 10{,}000$

$(1.15)^t = \frac{10{,}000}{1{,}000} = 10$

$t\ln(1.15) = \ln(10)$

$t = \frac{\ln(10)}{\ln(1.15)} = 16.475$

Time to \$10,000 is 16.475 years.