

# Key

**Quiz #5**  
**ECO 3401**  
**Dr. Gerking**

Bubble in the correct answer to each question on your BROWN scan-tron sheet. Write your name LEGIBLY on the scan-tron sheet, then find your form code at the top right corner of this page. Write the form code on your scan-tron sheet. You will turn in the scan-tron sheet, and keep this quiz sheet for your records.

**Solve the following:**

1. A debt of \$5,000 is due two years from now and \$5,000 due four years from now is to be repaid by a payment of \$2,000 in one year, a payment of \$4,000 in two years, and a final payment at the end of three years. If the interest rate is 1.5% compounded annually, how much is the final payment rounded to the nearest dollar?

(a) \$3,820  
 (b) \$3,881  
 (c) \$3,329  
 (d) \$3,699  
 (e) None of these

$$2000(1.015)^2 + 4000(1.015) + x = 5000(1.015) + 5000(1.015)^4 - 2000(1.015) - 4000(1.015)^2$$

$$x = 5000(1.015) + 5000(1.015)^4 - 2000(1.015) - 4000(1.015)^2$$

$$= 5075 + 4926.11 - 2060.45 - 4060$$

$$= 3880.66 \approx 3881$$

2. In a cost-cutting effort, a company will reduce its workforce at the rate of 3.5% per year. The company presently employs 25,000 workers. To the nearest person, how many people will be employed with the company after three years?

(a) 22,804  
 (b) 23,420  
 (c) 22,441  
 (d) 22,466  
 (e) None of these

$$p = 25,000(1 - 0.035)^t$$

$$= 25,000(0.965)^t$$

where  $p$  is the # of workers after  $t$  years

$$t=3: p = 25,000(0.965)^3 = 22,466$$

3. The demand equation for a consumer product is  $q = 80 - 3^p$ . Solve for  $p$  and express your answer in terms of natural logarithms. Evaluate  $p$  in terms of natural logarithms when when  $q = 50$ .

(a)  $p = \frac{\ln(80 - q)}{\ln 3}, p = \frac{\ln 30}{\ln 3}$   
 (b)  $p = \frac{\ln(80 - q)}{\ln 3}, p = \frac{\ln 50}{\ln 3}$   
 (c)  $p = \frac{\ln(80 - p)}{\ln 3}, p = \frac{\ln 30}{\ln 3}$   
 (d)  $p = \frac{\ln(80 - 3p)}{\ln 3}, p = \frac{\ln 50}{\ln 3}$   
 (e) None of these

$$q = 80 - 3^p$$

$$3^p = 80 - q$$

$$\ln 3^p = \ln(80 - q)$$

$$p \ln 3 = \ln(80 - q)$$

$$p = \frac{\ln(80 - q)}{\ln 3}$$

$$q = 50: p = \frac{\ln 30}{\ln 3}$$

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Solve the following:

- 1 In a cost-cutting effort, a company will reduce its workforce at the rate of 2.5% per year. The company presently employs 35,000 workers. To the nearest person, how many people will be employed with the company after three years?

(a) 32,500  
(b) 33,420  
(c) 32,440  
(d) 35,554  
(e) None of these

$$p = 35,000(1 - 0.025)^t$$
$$= 35,000(0.975)^t$$

where  $p$  is the # of workers after  $t$  years

$$t=3: p = 35,000(0.975)^3 = 32,440$$

2. The demand equation for a consumer product is  $q = 100 - 4^p$ . Solve for  $p$  and express your answer in terms of natural logarithms. Evaluate  $p$  in terms of natural logarithms when  $q = 60$ .

(a)  $p = \frac{\ln(100-p)}{\ln 4}$ ,  $p = \frac{\ln 40}{\ln 4}$   
(b)  $p = \frac{\ln(100-q)}{\ln 4}$ ,  $p = \frac{\ln 60}{\ln 4}$   
(c)  $p = \frac{\ln(100-q)}{\ln 4}$ ,  $p = \frac{\ln 40}{\ln 4}$   
(d)  $p = \frac{\ln(100-4p)}{\ln 4}$ ,  $p = \frac{\ln 40}{\ln 4}$   
(e) None of these

$$q = 100 - 4^p$$
$$4^p = 100 - q$$
$$\ln 4^p = \ln(100 - q)$$
$$p \ln 4 = \ln(100 - q)$$
$$p = \frac{\ln(100 - q)}{\ln 4}$$
$$q = 60: p = \frac{\ln 40}{\ln 4}$$

- 3 A debt of \$5,000 is due two years from now and \$5,000 due four years from now is to be repaid by a payment of \$2,000 in one year, a payment of \$4,000 in two years, and a final payment at the end of three years. If the interest rate is 2.5% compounded annually, how much is the final payment rounded to the nearest dollar?

(a) \$3,245  
(b) \$3,404  
(c) \$3,699  
(d) \$3,802  
(e) None of these

$$2,000(1.025)^2 + 4,000(1.025) + x = 5,000(1.025) + 5,000(1.025)^4$$
$$x = 5,000(1.025) + 5,000(1.025)^4 - 2,000(1.025)^2 - 4,000(1.025)$$
$$= 5,125 + 4,878.05 - 2,101.25 - 4,100$$
$$= 3,801.70 \approx 3,802$$