

Test 2

This test is graded out of 65 marks. No books, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. (2 marks)

Express the percent 0.1% as a fraction and as a decimal.

$$\frac{1}{1000}, 0.001$$

Question 2. (4 marks)

Evaluate the following to two decimal places:

1. $\ln(e^{11}) = 11$

2. $(1.3847362)^{\frac{1}{3}} = 1.22$

3. $(0.3388847)^0 = 1$

4. $-(0.8874661)^0 = -1$

Question 3. (4 marks)

Louis Ling earned \$465.45 for the week. If he receives a base salary of \$200 and has a quota of \$3 500 and a commission of 5.25% on sales that exceed his quota. How much did Louis sell this week.

$$\text{Salary based on sales} = 465.45 - 200 = \$265.45$$

$$\text{Amount of sales} = \frac{265.45}{5.25\%} = \frac{265.45}{0.0525} = \$5056.19$$

minus quota

$$\text{Amount of sales} = \$3500 + \$5056.19 = \$8556.19$$

Question 4. (3 marks)

A house in Montreal is evaluated at \$485 000. How much will the property tax cost the owner if the mill rate is 35.43.

$$\begin{aligned} \text{Property tax} &= (\text{evaluation of property}) \times \frac{\text{mill rate}}{1000} \\ &= 485\,000 \times \frac{35.43}{1000} = \$17\,183.55 \end{aligned}$$

\therefore the property tax is \$17 183.55

Question 5. (3 marks)

Simplify the following:

$$\begin{aligned}
22 + \frac{1}{4} \left[\frac{3^3 - 2(1-3)}{4^3 - 4} \right] - \frac{2}{5} &= 22 + \frac{1}{4} \left[\frac{27+4}{64-4} \right] - \frac{2}{5} \\
&= 22 + \frac{31}{240} - \frac{2}{5} \\
&= \frac{1043}{48} \approx 21.46
\end{aligned}$$

Question 6. (3 marks)

Simplify the following:

$$\begin{aligned}
-2(x-5)(2-y) + 5(3x^2-8)(y+4) &= -2[2x-xy-10+5y] + 5[3x^2y+12x^2-8y-32] \\
&= -4x+2xy+20-10y+15x^2y+60x^2-40y-160 \\
&= 15x^2y+60x^2+2xy-4x-50y-140
\end{aligned}$$

Question 7. (3 marks)

Expand and simplify the following:

$$\begin{aligned}
(x-2)^3 &= [x^2-4x+4](x-2) \\
&= x^3-4x^2+4x-2x^2+8x-8 \\
&= x^3-6x^2+12x-8
\end{aligned}$$

Question 8. (3 marks)

A computer screen is listed at \$485 less 20%. The net price is reduced further to \$320. What is the additional rate of discount?

$$\begin{aligned}
\text{net price} &= \text{list price} (1-d_1)(1-d_2) \\
320 &= 485 (1-0.20)(1-d_2) \\
320 &= 388 (1-d_2) \\
\frac{320}{388} &= (1-d_2)
\end{aligned}$$

$$d_2 = 17.53\%$$

∴ the discount is of 17.53%

Question 9. (3 marks)

An invoice of \$1 732 was received with terms 4.5/15, n/30. What amount will reduce the balance to \$1 300 if the amount is paid during the discount period?

$$\begin{aligned} \text{Amount to be paid} &= 1732 - 1300 \\ &= \$432 \end{aligned}$$

$$\begin{aligned} \text{Amount to be paid with discount} &= 432(1 - 0.045) \\ &= 412.56 \end{aligned}$$

∴ the amount paid with discount is \$412.56

Question 10. (4 marks)

Ansel's Photo Store sells a Leica camera for \$3 100. The markup is 15% of cost. How much does Ansel pay for the camera? What is the rate of markup based on selling price?

$$\begin{aligned} S &= C + M \\ S &= C + 15\% \text{ of } C \\ 3100 &= C + 0.15C \\ 3100 &= 1.15C \end{aligned}$$

$$\$2695.65 = C$$

$$\begin{aligned} M &= S - C \\ &= 3100 - 2695.65 \end{aligned}$$

$$\begin{aligned} \text{rate of markup} &= \frac{404.35}{3100} \\ &= 13.04\% \end{aligned}$$

∴ Ansel pays \$2695.65 for the camera and the markup based on the selling price is 13.04%

Question 11. (3 marks)

A shoe company sells a brand name shoe for \$139.99. If the shoe company wants to markdown the shoe to a price of \$119.99. What is the rate of the markdown?

$$\begin{aligned} \text{Mark down} &= \frac{\text{discount}}{\text{selling price}} \\ &= \frac{139.99 - 119.99}{139.99} \\ &= 14.29\% \end{aligned}$$

∴ the markdown is 14.29%

Question 12. (5 marks)

Super Cool Audio buys an MP3/OGG Vorbis player listed at \$530 less 25%, 30% and 5%. Expenses are 25% of the regular selling price, with a ~~net~~ profit of 15% of the regular selling price. What is the regular selling price? During a store sale the MP3 player is advertised with a 25% discount. What is the operating loss or profit realized on the sale of one MP3/OGG Vorbis player?

$$\begin{aligned} \text{net price} &= \text{List price } (1-d_1)(1-d_2)(1-d_3) \\ &= 530 (1-0.25)(1-0.30)(1-0.05) = \$264.34 \end{aligned}$$

$$\begin{aligned} S &= C + E + P \\ S &= 264.34 + 25\% \text{ of } S + 15\% \text{ of } S \\ S &= 264.34 + 0.25S + 0.15S \end{aligned}$$

$$\begin{aligned} \text{Profit} &= S - C - E \\ &= 330.43 - 264.34 - 110.14 \\ &= -44.05 \end{aligned}$$

$$0.6S = 264.34$$

$$S = \$440.57$$

$$\begin{aligned} \text{Sale price} &= 0.75(440.57) \\ &= 330.43 \end{aligned}$$

$$\text{Expenses} = 25\% \text{ of } S = 0.25(440.57) = \$110.14$$

∴ the sale at 25% is giving an operating loss of \$44.05

Question 13. (3 marks)

Garry invested \$5 550 for 5 months in a simple interest scheme, with interest at 5.4% p.a.. How much interest did Garry earn in ~~7~~ months?

$$\begin{aligned} I &= Prt \\ &= (5550)(0.054)\left(\frac{5}{12}\right) \\ &= \$124.88 \end{aligned}$$

or

$$\begin{aligned} I &= Prt \\ &= 5550(0.054)\left(\frac{7}{12}\right) \\ &= 174.82 \end{aligned}$$

∴ the interest earned is \$124.88

∴ the interest earned is \$174.82

Question 14. (3 marks)

Solve for x:

$$-3(x+5) + (x-6) + 2 = 2(3x-3) - 3$$

$$-3x - 15 + x - 6 + 2 = 6x - 6 - 3$$

$$-2x = -9 + 19$$

$$x = \frac{-10}{2}$$

$$x = \frac{-5}{4} = -1.25$$

Question 15. (3 marks)

Solve for x:

$$\frac{2}{5}(4x+5) - \frac{2}{3}(15x-6) = \frac{11}{10} - x + 3$$

$$\frac{2}{5}(4x+5) - \frac{2}{3}(15x-6) = \frac{11}{10} - x + 3$$

$$12(4x+5) - 20(15x-6) = 33 - 30x + 90$$

$$48x + 60 - 300x + 120 = 123 - 30x$$

$$60 + 120 - 123 = 300x - 30x - 48x$$

$$57 = 222x$$

$$\frac{57}{222} = x$$

$$x = 0.256$$

$$\therefore x = 0.256$$

Question 16. (3 marks)

George received \$23.59 interest for a deposit of \$4 100 invested for a period of 60 days. What was the rate of interest p.a.?

$$I = Prt$$

$$23.59 = (4100)(r)\left(\frac{60}{365}\right)$$

$$r = 3.5\%$$

\therefore the interest rate is 3.5% p.a.

Question 17. (2 marks)

Compute the future value of \$1 920 over five months at $5\frac{1}{4}\%$?

$$S = P(1+rt)$$

$$= 1920\left(1 + \frac{5}{12}(0.0525)\right)$$

$$= \$1962$$

\therefore the future value is \$1962

Question 18. (2 marks)

Compute the present value of a debt of \$838.21, 71 days before it is due if money is worth 8.9% p.a.?

$$P = \frac{S}{(1+rt)}$$

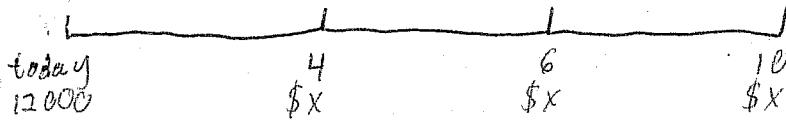
$$= \frac{838.21}{\left(1 + 0.089\left(\frac{71}{365}\right)\right)}$$

$$= \$823.95$$

\therefore the present value is \$823.95

Question 19. (5 marks)

Emma borrows \$12 000 today from the Half-Bad Bank at a rate of 9%. If Emma is to repay the loan in 3 equal payments the first being in 4 months, the second 6 months and the third in 10 months. What is the size of the equal payments (Emma and the Half-Bad Bank determine that the focal date is today)?



$$12000 = \frac{X}{(1+0.09(\frac{4}{12}))} + \frac{X}{(1+0.09(\frac{6}{12}))} + \frac{X}{(1+0.09(\frac{10}{12}))}$$

$$12000 = 0.970874X + 0.956938X + 0.930234X$$

$$X = \$4198.67$$

∴ the size of the equal payments is \$4198.67

Question 20. (4 marks)

The component cost to make an MP3/OGG Vorbis player is five-seventh of the total cost and labour is one-fourth of the material cost. If cost of labour is \$13 what is the total cost of the MP3/OGG Vorbis player.

Bonus Question (2 marks)

A former AEC student is hired as a manager at David Hilbert's Hotel which is a very large hotel, in fact, it has infinitely many rooms numbered 1, 2, 3, The hotel is very popular and every room is occupied one night.

That night a new guest arrives.

-Is there any free room?

-No, the former AEC student said.

-Oh, what a pity, the guest said and started to walk away.

-But wait, you can still get a room.

How can the former AEC student accommodate the guest?

The former student ask the guest to go to room 1. He then ask the guest in room 1 to move to room 2
" " " " " 2 " " " " 3
" " " " " 3 " " " " 4

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