

0C1/1C1 TAKE HOME TEST 1, 2011, SOLUTIONS

- (a) $16/(15 - 3) - 2 = 16/12 - 2/1 = (16 \times 1 - 12 \times 2)/(12 \times 1) = -8/12 = -2/3$

(b) $(15 - 23)/2^2 = -8/4 = -2$

(c) $(7/4) - 5 \times (1/3) = 7/4 - 5/3 = (7 \times 3 - 4 \times 5)/(4 \times 3) = (21 - 20)/12 = 1/12$

(d) $(4 - (2 - 7))/(5 - (9 + 14)) = (4 - (-5))/(5 - 23) = 9/(-18) = -1/2$
- (i) $(a - b)(c - a) = ac - a^2 - bc + ba$

(ii) $(x + y)(x - 1 - y) = x(x - 1 - y) + y(x - 1 - y) = x^2 - x - xy + xy - y - y^2 = x^2 - y^2 - x - y$

(iii) $(1 - x)(2x + 1)(1 + x) = (1 - x)(2x + 2x^2 + 1 + x) = (1 - x)(2x^2 + 3x + 1) = 2x^2 + 3x + 1 - 2x^3 - 3x^2 - x = -2x^3 - x^2 + 2x + 1$

(iv) $(q - p)(q - (p - 1)) = (q - p)(q - p + 1) = q^2 - pq + q - pq + p^2 - p = p^2 + q^2 - 2pq - p + q$

(v) The term in x in (iii) is $2x$

(vi) The coefficient of x^2 in (iii) is -1
- (i) $\frac{a^3 b^5}{a^7 b^2} = a^{3-7} b^{5-2} = a^{-4} b^3$

(ii) $\left(\frac{b^{1/3}}{ab^{-3/4}}\right)^{-1} = (b^{(1/3)-(-3/4)} a^{-1})^{-1} = (b^{(1/3+3/4)} a^{-1})^{-1} = (b^{13/12} a^{-1})^{-1} = b^{(-1) \times (13/12)} a^{(-1) \times (-1)} = b^{-13/12} a$
- (i) $\log((uv)/w) = \log(uv) - \log w = \log u + \log v - \log w$

(ii) $\log\left(\sqrt{u^{-3}v^{4/3}}\right) = \left(\frac{1}{2}\right) \times \log(u^{-3}v^{4/3}) = \frac{1}{2}(\log(u^{-3}) + \log(v^{4/3})) = \frac{1}{2}(-3 \log(u) + (4/3) \log(v)) = -(3/2) \log u + (2/3) \log v$
- By the change of base rule $\log_8(3) = \frac{\log_2(3)}{\log_2(8)}$, and since $8 = 2^3$, $\log_2(8) = 3$ and we get that $\log_8(3) = a/3$

Feedback

- If you had any parts wrong then check out the model answers. You are quite likely to get questions like these in the exam so make sure you don't repeat the same mistakes there, when you won't have a lot of time.
- In 1(a) many students did not apply the conventional BDMAS rules. You first work out the brackets, which gives $16/(15 - 3) - 2 = 16/12 - 2$. You then do the division to get $\frac{16}{12} - 2 = \frac{4}{3} - 2$. You then do the subtraction to get $-\frac{2}{3}$.
- Marks were lost through not answering the question. For example in 1(d) the answer was left as $9/(-18)$ which is neither in the simplest form (i.e. $-\frac{1}{2}$) nor in the form of an integer or rational $\frac{p}{q}$ with p an integer and q a natural number.
- In 1(b) you can simplify $\frac{-2}{1}$ to -2 (though I didn't penalize for this).
- In question 2 some students failed to answer the question by not collecting terms. Another common (yet completely inexplicable) mistake in 2(iv) was to 'work out' $q - (p - 1)$ as $qp - q$, in other words treat the first minus sign as if it was multiplication.
- Don't write $1x$ or xx , it's babyish. Write x or x^2 instead.
- In question 4(ii) many students failed to give the answer in terms of $\log u$ and $\log v$, leaving it, for example, as $\frac{1}{2}(\log(u^{-3}) + \log(v^{4/3}))$. I can't emphasize often enough . . .

Read the question!