Task 1: Give it a go

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	4 / 4	Review
Question 2	3 / 3	Review
Question 3	6 / 6	Review
Question 4	5 / 5	Review
Question 5	2 / 2	Review
Total	20 / 20 (100%)	

Performance Summary

Exam Name:	SIT190 - Week 5 - Quiz - Short
Session ID:	15941749110
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Wed Apr 03 2024 12:42:00
Exam Stop:	Wed Apr 03 2024 20:38:56
Time Spent:	1:40:55

SIT190 - Week 5 - Quiz - Short

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	4 / 4	Review
Question 2	3 / 3	Review
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Performance Summary

Exam Name:	SIT190 - Week 5 - Quiz - Short
Session ID:	11898830234
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Wed Apr 03 2024 20:40:07
Exam Stop:	Wed Apr 03 2024 21:18:33
Time Spent:	0:38:25

1 & 3)

2) Review

a) Identify a question to ask

I need to understand how to do square root simplifications as I do not understand them. I also need to better understand the ranges of logs.

b) Identify & implement a strategy addressing this question

I plan to review the course materials and play around with my CAS calculator to find a way that works for me. If these do not help, I will request assistance from the teacher.

c) Describe the identified question and your implementation strategy

The question I got stuck on was simplifying $\sqrt{98}$. After I saw the answer to the question, I understood it better. I did not understand what it was even asking but after viewing it, I did, though I still did not understand how to do it. Course materials and calculator play are necessary.

4) Short reflection on improvements

I improved significantly, much like the other times I've done these quizzes. By reviewing course materials then finding factors on my calculator, I could understand what was happening to reach the correct answers. Without having some fun and trial & error on the calculator, I do not believe I would have understood what was happening.

Task 2: Index rules

1) Simply each expression, showing 1 rule/step

a) $12^2 4^3 - 4^2 4$

$12^2 4^3 - 4^2 4$
-> $(144 * 64) - (4^{2+1})$

Here we applied the multiplication rule $a^m \times a^n = a^{m+n}$.
We simply calculated $12^2 4^3$ as a is not the same, $12 \neq 4$
-> $9216 - 4^3$
-> $9216 - 64$
9152

b) $\frac{x^6x^3}{x^2} + (4x^3)^2$

$\frac{x^6x^3}{x^2} + (4x^3)^2$
We'll focus on $\frac{x^6x^3}{x^2}$, where we apply the multiplication rule
-> $x^6x^3 = x^{6+3} = x^9$
-> $\frac{x^9}{x^2}$
Then, we apply the division rule $\frac{a^m}{a^n} = a^{m-n}$
-> $\frac{x^9}{x^2} = x^{9-2} = x^7$

The equation now is $x^7 + (4x^3)^2$
Focusing on $(4x^3)^2$ now, we apply the bracketed multiplication rule $(ab)^n = a^nb^n$ to the 4
-> $(4)^2 = 4^2 = 16$
Then, we apply another variation of the bracketed multiplication rule, $(a^m)^n = a^{mn}$ to the x^3
-> $(x^3)^2$
-> x^{3*2}
x^6

The equation is now $x^7 + 16x^6$.
It can be further simplified by factoring now.
Each x has at least 6 powers, and there is only one number, 16.
We can therefore simplify by using the multiplication rules like so:
-> $x^7 + 16 * x^6$
-> $x^{7-6} = x^1$ (subtraction rule)
This is the smallest value that the internal brackets can be
$?(x \pm ?)$
For $16x^6$ to be achieved, we need to times 16 by x^6
-> $x^6(x \pm ?)$. This shows the multiplication rule. $x^6 + x^1 = x^7$
Then, we need to add the 16 in
-> $x^6(x + 16)$

c) $\frac{2x^{10} - 3x^2}{x^2}$

There is an opportunity to divide the common factor of x^2 exponents using the division rule.
-> $\frac{2x^{10} - 3x^2}{x^2}$
-> $\frac{2x^{10-2} - 3x^{2-2}}{x^{2-2}}$
-> $\frac{2x^8 - 3x^0}{x^0}$
-> $\frac{2x^8 - 3(1)}{1}$
In one fell swoop, we have removed the division entirely, one x^2 term, and significantly reduced the size of the fraction into
$2x^8 - 3$

2) Solve $13x^2 = 39$ for x

$13x^2 = 39$
-> $x^2 = \frac{39}{13}$
-> $x^2 = 3$
$x = \sqrt{3}$

Task 3: Log rules

1) Simplify each log expression and state each rule as applied

a) $log_8(4) + log_8(2)$

$log_8(4) + log_8(2)$
We use the log law of addition to calculate this.

-> $log_8(4 \times 2)$
-> $log_8(8)$
The base and the number are identical, which is subject to the $log_a(a) = 1$ law.
$log_8(8) = 1$

b) $2log_2(12) - log_2(4)$

$2log_2(12) - log_2(4)$
We want to first recondense the $2log_2(12)$ statement into a subtractable statement using the log [law](law)
$log_a(m^n) = (n)log_a(m)$

$2log_2(12)$
-> $log_2(12^2)$
-> $log_2(144)$

Now we can subtract using the subtraction law $log_a(m) - log_a(n) = log_a(\frac{m}{n})$
$log_2(144) - log_2(4)$
-> $log_2(\frac{144}{4})$
and get the final answer of $log_2(36)$

2) Simplify $log_{15}(60)$ by changing base

Changing base formula: $log_a(b) = \frac{log_c(b)}{log_c(a)}$

$log_{15}(60)$ = 1.5119
-> $a = 15$ and $b = 60$
-> $\frac{log_{60}(60)}{log_{60(15)}}$
$\frac{1}{log_{60}(15)}$

Factors of 60:

- $1 * 60$

- $2 * 30$
- $3 * 20$
- $4 * 15$
- $5 * 12$
- $6 * 10$

Factors of 15:

- $1 * 15$
- $3 * 5$

$log_{10}(3) + log_{10}(5) + log_{10}(4)$
$log_{10}(6) + log_{10}(10)$

=log((60/15)) = 0.6020599913
=log(60) / log(15) = 1.51191604

3) Solve for x

a) $ln(x + 3) = 7$

-> $e^{ln(x+3)} = e^7$
-> $x + 3 = e^7$
$x = e^7 - 3 = -2.901$

b) $e^{4x-7} = 8$

-> $ln(e^{4x-7}) = ln(8)$
-> $4x - 7 = ln(8)$
-> $4x = ln(8) + 7$
$x = \frac{ln(8)+7}{4} = 2.270$

Task 4: Cultural contribution

1) Describe an application in Ancient Egypt requiring mathematics

2) Why was mathematics needed in it?

3) Solve $x + \frac{3x}{24} = 11$ using Egyptian heap-calculation

-> Guess of $x = 8$
-> $8 + \frac{3(8)}{24} = 11$
-> $8 + \frac{24}{24} = 11$
-> $8 + 1 = 11$
$9 \neq 11$
Since the left does not equal the right, we divide the RHS by the LHS
-> $\frac{\text{RHS}}{\text{LHS}} \rightarrow \frac{11}{9}$

Multiply our guess ($x = 8$) by this fraction to find the true value of x
-> $8 \times \frac{11}{9}$
-> $\frac{88}{9} = 9.7\dot{7}$

Verify
$x + \frac{3x}{24} = 11$
-> $\frac{88}{9} + \frac{3(\frac{88}{9})}{24} = 11$
-> $\frac{88}{9} + \frac{\frac{88}{3}}{24} = 11$
-> $\frac{88}{9} + \frac{11}{9} = 11$
-> $\frac{99}{9} = 11$
$11 = 11$

4) Solve $x + \frac{x}{3} = 16$ using modern methods

$x + \frac{x}{3} = 16$
We multiply the whole left side by 3, not just the $\frac{x}{3}$