

FRQ #4 – Symbolic Manipulation

NO CALCULATOR

Name: _____

CA #2**Answer the following practice FRQ #4 question. Grade using the scoring rubric.**

1.

(A) The functions g and h are given by

$$g(x) = \log_3(2x) + 4 \qquad h(x) = \arccos(2x) - \pi$$

(i) Solve $g(x) = 6$ for values of x in the domain of g .(ii) Solve $h(x) = -\frac{\pi}{2}$ for values of x in the domain of h .**(B) The functions j and k are given by**

$$j(x) = \frac{\sec x}{\csc x \cot x} \qquad k(x) = \frac{(e^{2x})(e^4)^x}{e}$$

(i) Rewrite $j(x)$ as a single term involving $\tan^2 x$.(ii) Rewrite $k(x)$ as a single exponential without negative exponents in any part of the expression. Your result should be in the form of $e^{(\text{expression})}$.**(C) The function m is given by**

$$m(x) = 2 \sin\left(x + \frac{\pi}{2}\right)$$

Find all input values in the domain of m that yield on output value of 1.**Your Score: ____ out of 6 points**

Answers to FRQ #4 Symbolic Manipulation CA #2

Model Solution	Scoring
<p>A</p> <p>i. $g(x) = 6$ $6 = \log_3(2x) + 4$ $2 = \log_3(2x)$ $3^2 = 3^{\log_3(2x)}$ $9 = 2x$ $\frac{9}{2} = x$</p>	<p>Solution to $g(x) = 6$</p> <p style="text-align: right;">1 point</p>
<p>ii. $h(x) = -\frac{\pi}{2}$ $-\frac{\pi}{2} = \arccos(2x) - \pi$ $\frac{\pi}{2} = \arccos(2x)$ $\cos\left(\frac{\pi}{2}\right) = \cos(\arccos(2x))$ $0 = 2x$ $0 = x$</p>	<p>Solution to $h(x) = -\frac{\pi}{2}$</p> <p style="text-align: right;">1 point</p>
<p>B</p> <p>i. $j(x) = \frac{\sec x}{\csc x \cot x}$ $j(x) = \frac{\frac{1}{\cos x}}{\frac{1}{\sin x} \cdot \frac{\cos x}{\sin x}}$ $j(x) = \frac{\frac{\cos x}{\cos x}}{\frac{1}{\sin^2 x}}$ $j(x) = \frac{1}{\cos x} \cdot \frac{\sin^2 x}{\cos x}$ $j(x) = \frac{\sin^2 x}{\cos^2 x}$ $j(x) = \tan^2 x$</p>	<p>Expression for $j(x)$</p> <p style="text-align: right;">1 point</p>
<p>ii. $k(x) = \frac{(e^{2x})(e^4)^x}{e}$ $k(x) = \frac{(e^{2x})(e^{4x})}{e}$ $k(x) = \frac{e^{6x}}{e}$ $k(x) = e^{6x-1}$</p>	<p>Expression for $k(x)$</p> <p style="text-align: right;">1 point</p>
<p>C</p> <p style="text-align: center;">$m(x) = 1 \Rightarrow 2 \sin\left(x + \frac{\pi}{2}\right) = 1$</p> <p>$\sin\left(x + \frac{\pi}{2}\right) = \frac{1}{2}$ $\sin^{-1}\left(\sin\left(x + \frac{\pi}{2}\right)\right) = \sin^{-1}\left(\frac{1}{2}\right)$ $x + \frac{\pi}{2} = \frac{\pi}{6} + 2\pi n$ and $x + \frac{\pi}{2} = \frac{5\pi}{6} + 2\pi n$ $x = -\frac{\pi}{3} + 2\pi n$ and $x = \frac{\pi}{3} + 2\pi n$ <p style="text-align: center;">where n is any integer</p> </p>	<p>One value of x</p> <p style="text-align: right;">1 point</p> <hr/> <p>All values of x</p> <p style="text-align: right;">1 point</p>