

f r q

Directions:

- Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number. Angle measures for trigonometric functions are assumed to be in radians.
- Solutions to equations must be real numbers. Determine the exact value of any expression that can be obtained without a calculator. For example, $\log_2 8$, $\cos\left(\frac{\pi}{2}\right)$, and $\sin^{-1}(1)$ can be evaluated without a calculator.
- Unless otherwise specified, combine terms using algebraic methods and rules for exponents and logarithms, where applicable. For example, $2x + 3x$, $5^2 \cdot 5^3$, $\frac{x^5}{x^2}$, and $\ln 3 + \ln 5$ should be rewritten in equivalent forms.
- For each part of the question, show the work that leads to your answers.

21. Part A

The functions g and h are given by

$$g(x) = \log_5(4x - 2)$$

$$h(x) = \sin^{-1}(8x).$$

- (i) Solve $g(x) = 3$ for values of x in the domain of g .
- (ii) Solve $h(x) = \frac{\pi}{4}$ for values of x in the domain of h .

Part B

The functions j and k are given by

$$j(x) = (\sec x)(\cot x)$$

$$k(x) = \frac{(16^{3x}) \cdot 4^x}{2}.$$

- (i) Rewrite $j(x)$ as an expression involving $\sin x$ and no other trigonometric functions.
- (ii) Rewrite $k(x)$ as an expression of the form $4^{(ax+b)}$, where a and b are constants.

Part C

The function m is given by

$$m(x) = \sqrt{3} \tan\left(x + \frac{\pi}{2}\right).$$

Find all values in the domain of m that yield an output value of 1.

Part A

Select a point value to view scoring criteria, solutions, and/or examples to score the response.