

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,  $\log_2 8$ ,  $\cos(\frac{\pi}{2})$ , 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.

**22. Part A**

The functions  $g$  and  $h$  are given by

$$g(x) = 3 \ln x - \frac{1}{2} \ln x$$

$$h(x) = \frac{\sin^2 x - 1}{\cos x}.$$

- (i) Rewrite  $g(x)$  as a single natural logarithm without negative exponents in any part of the expression. Your result should be of the form  $\ln(\text{expression})$ .
- (ii) Rewrite  $h(x)$  as an expression in which  $\cos x$  appears once and no other trigonometric functions are involved.

**Part A**

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



0

1

2

The student response includes both of these criteria.

- Expression for  $g(x)$
- Expression for  $h(x)$

**Model Solution**

(i)  $g(x) = 3 \ln x - \frac{1}{2} \ln x$