

Name: _____

- Each question is prefaced with a Standard for this course.
- When grading, each response will be marked as follows:
 - ✓: The response demonstrates complete understanding of the Standard.
 - ★: The response may indicate full understanding of the Standard, but clarification or minor corrections are required.
 - ×: The response does not demonstrate complete understanding of the Standard.
- Only responses marked with a ✓ mark count toward your grade for the semester. Visit the course website for more information on how to improve ★ and × marks.
- This Assessment is due after 50 minutes. All blank responses will be marked with ×.

Standard Assessment 3

[illegible]

Let f^{\leftarrow} denote the inverse function of an invertible function f ; in particular, if $f(x) = \ln(x)$, then $f^{\leftarrow}(x) = \exp(x)$.

Use the theorem $\frac{d}{dx}[f^{\leftarrow}(x)] = \frac{1}{f'(f^{\leftarrow}(x))}$ to prove that $\frac{d}{dx}[\exp x] = \exp x$.

Standard Assessment 3

<p>C02: This student is able to...</p> <p>Prove hyperbolic function identities.</p>	Mark: (Instructor Use Only)
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Use the definitions

$$\tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}, \operatorname{sech}(x) = \frac{2}{e^x + e^{-x}}$$

to prove the following identity.

$$1 - \tanh^2(x) = \operatorname{sech}^2(x)$$

Standard Assessment 3

[illegible]

Recall that $\frac{d}{du}[\tan u] = \sec^2 u$. Find $\int 4x \sec^2(x^2) dx$.

Standard Assessment 3

C04: This student is able to... Use integration by parts.	Mark: (Instructor Use Only)
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Find $\int r^2 e^r dr$.

Standard Assessment 3

<p>C05: This student is able to... Identify and use appropriate integration techniques.</p>	<p>Mark:</p> <p>(Instructor Use Only)</p>
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Draw lines matching each of the five integrals on the left with the most appropriate integration technique listed on the right. Multiple techniques may be technically possible, but choose the technique most useful to begin integration. Every integral and technique is used exactly once in the correct answer.

$$\int x \sin(x) dx$$

$$\int \cos^4(x) dx$$

$$\int \frac{1}{x\sqrt{x^2+1}} dx$$

$$\int \frac{4x}{3x^2-1} dx$$

$$\int \frac{7x^2+x+12}{x^3+3x} dx$$

- Integration by Substiution
- Method of Partial Fractions
- Trigonometric Identities
- Trigonometric Substitution
- Integration by Parts

Standard Assessment 3

<p>C06: This student is able to...</p> <p>Express an area between curves as a definite integral.</p>	Mark: (Instructor Use Only)
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Find a definite integral equal to the area between the curves $y = 1 - x$ and $y = x^2 - 1$.

Standard Assessment 3

[illegible]

Find $\int 2 \cos^2(y) \, dy$.

Standard Assessment 3

<p>S04: This student is able to... Use trigonometric substitution.</p>	<p>Mark:</p> <p>(Instructor Use Only)</p>
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Find $\int \frac{z+1}{\sqrt{1-z^2}} dz$.

Standard Assessment 3

S05: This student is able to... Use partial fractions to integrate rational functions.	Mark: (Instructor Use Only)
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a) Complete the following partial fraction expansion:

$$\frac{f(x)}{(x^2 + 3)^2(x - 7)^4} = \frac{\quad}{x^2 + 3} + \frac{\quad}{(x^2 + 3)^2} + \frac{\quad}{x - 7} + \frac{\quad}{(x - 7)^2} + \frac{\quad}{(x - 7)^3} + \frac{\quad}{(x - 7)^4}$$

(Assume the degree of f is less than 8. You do NOT need to solve for your constants.)

b) Find $\int \frac{3x^2 - x + 2}{(x^2 + 1)(x - 1)} dx$.

Standard Assessment 3

<p>S06: This student is able to...</p> <p>Use cross-sectioning to express a volume as a definite integral.</p>	Mark: (Instructor Use Only)
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Find a definite integral that equals the volume of a pyramid positioned from $x = 0$ to $x = 4$ with square cross-sections of side length $\frac{x}{2}$.

Standard Assessment 3

Use this space if you need extra room for a problem: