

BC Calculus '17-18  
Integration Techniques Test

name \_\_\_\_\_

Score \_\_\_\_\_

1.  $\int \frac{4}{x^2 - 4x - 12} dx =$

(a)  $\frac{1}{2} \ln \left| \frac{x+2}{x-6} \right| + c$

(b)  $\frac{1}{2} \ln \left| \frac{x-6}{x+2} \right| + C$

(c)  $\frac{1}{8} \ln |(x-6)(x+2)| + C$

(d)  $\frac{1}{8} \ln |(x-6)(x+2)| + C$

(e)  $\frac{1}{8} \ln \left| \frac{x-6}{x+2} \right| + C$

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2.  $\int xe^{2x} dx =$

(a)  $\frac{1}{4} e^{2x} (2x-1) + c$    (b)  $\frac{1}{2} e^{2x} (2x-1) + c$    (c)  $\frac{1}{4} e^{2x} (4x-1) + c$

(d)  $\frac{1}{2} e^{2x} (x-1) + c$    (e)  $\frac{1}{4} e^{2x} (x-1) + c$

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3. What is the best method to evaluate  $\int \frac{1}{x^2 + 4x + 7} dx = ?$

- (a) Integration by Parts      (b) Substitution      (c) Partial Fractions  
(d) Completing the Square      (e) None of these
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4.  $\int \frac{e^{x^2} - 2x}{e^{x^2}} dx =$

- a)  $-e^{-x^2} + c$   
b)  $-e^{x^2} + c$   
c)  $x - e^{x^2} + c$   
d)  $x + e^{-x^2} + c$   
e)  $x - e^{-x^2} + c$
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5. What is the best method to evaluate  $\int \frac{dx}{x\sqrt{4x^2 - 9}}$ ?

- a) Integration by Parts      b) Substitution      c) Partial Fractions  
d) Completing the Square      e) None of these
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6. The population  $P(t)$  of a species satisfies the logistic differential equation  $\frac{dP}{dt} = \frac{1}{4000}P(400 - P)$ , where  $P(0) = 100$ . What is the **maximum rate of change** of  $P(t)$ ?

- a) 10
  - b) 100
  - c) 200
  - d) 400
  - e) 4000
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7. Which of the following statements are true?

I.  $\int (\sin^3 x \cos^2 x) dx = \frac{1}{5} \cos^5 x - \frac{1}{3} \cos^3 x + c$

II.  $\int \sec 2x dx = 2 \sec 2x \tan 2x + c$

III.  $\int \left( \frac{3x^2 + 6x - 4}{(x^3 + 3x^2 - 4x + 2)^2} \right) dx = \ln|x^3 + 3x^2 - 4x + 2|^2 + c$

- a) I only
  - b) II only
  - c) III only
  - d) I and II only
  - e) II and III only
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7. Find the volume of the solid formed when the region bounded by  $y = x^2 e^{-2x}$  and the  $x$ -axis on  $x \in [-1, 0]$  is revolved about the  $x$ -axis. Show the anti-differentiation.

8.  $\int x \cot^{-1} x^2 dx$

9.  $\int \frac{2x^4 + 3x^3 - 14x^2 - 7x + 18}{x^3 - 7x + 6} dx$