

BC Calculus '16-17
Integration Techniques Test

name _____

Score _____

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

(a) $\frac{1}{4} \ln|(x-1)(x+3)| + c$

(b) $\frac{1}{4} \ln \left| \frac{x-3}{x+1} \right| + c$

(c) $\frac{1}{4} \ln \left| \frac{x+1}{x-3} \right| + c$

(d) $\frac{\ln|x^2 - 2x - 3|}{2x - 2} + c$

(e) $\frac{1}{2} \ln|x^2 - 2x - 3| + c$

2. $\int_0^{\pi/6} \sec^2(2\theta) \tan(2\theta) d\theta =$

a. $\frac{3}{4}$

b. $\frac{3}{2}$

c. $\sqrt{3}$

d. $\frac{2\pi}{3}$

e. $\pi\sqrt{3}$

3. What is the best method to evaluate $\int \frac{5}{x^3 - 4x} dx = ?$

- (a) Integration by Parts (b) Substitution (c) Partial Fractions
(d) Completing the Square (e) None of these
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4. $\int \frac{5}{16x^2 - 7} dx =$

- (a) $\frac{5}{4\sqrt{7}} \tan^{-1}\left(\frac{4x}{\sqrt{7}}\right) + c$ (b) $\frac{5}{\sqrt{7}} \tan^{-1}\left(\frac{4x}{\sqrt{7}}\right) + c$
(c) $\frac{5}{\sqrt{7}} \ln\left|\frac{4x - \sqrt{7}}{4x + \sqrt{7}}\right| + c$ (d) $\frac{5}{2\sqrt{7}} \ln\left|\frac{4x - \sqrt{7}}{4x + \sqrt{7}}\right| + c$
(e) $\frac{5}{8\sqrt{7}} \ln\left|\frac{4x - \sqrt{7}}{4x + \sqrt{7}}\right| + c$
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5. The population of rabbits living on a farm grows logistically. The farmer counts 20 rabbits at time $t=0$ months, and notices that the population is growing fastest when there are 40 rabbits on the farm. Being a calculus whiz, the farmer estimates the carrying capacity of the farm to be:

- (a) 40 rabbits
 - (b) 60 rabbits
 - (c) 80 rabbits
 - (d) 100 rabbits
 - (e) 800 rabbits
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6. $\int_1^4 \ln \sqrt{y} \, dy =$

- (a) $4 \ln 2 - \frac{3}{2}$
 - (b) $\ln 2 - \frac{2}{3}$
 - (c) $4 \ln 2 - \frac{14}{3}$
 - (d) $\ln 2 - \frac{5}{2}$
 - (e) none of these
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7. $\int e^{2\theta} \cos(4\theta) d\theta =$

8. Find the volume of the solid whose base is bounded by $y = \sqrt{x \cos x}$, $y = 0$, $x = 0$, and $x = \frac{\pi}{2}$ and whose cross sections perpendicular to the x-axis are squares.

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