

AP Calculus BC '16-17
Integral Memory Quiz #3

Name _____

Score _____

$$\int u^n du =$$

$$\int \csc u \cot u du =$$

$$\int \frac{du}{a^2 + u^2} =$$

$$\int \cos u du =$$

$$\int \sin u du =$$

$$\int \frac{du}{\sqrt{a^2 - u^2}} =$$

$$\int \sec^2 u du =$$

$$\int \sin^2 u du =$$

$$\int \cot u du =$$

$$\int \frac{du}{u\sqrt{u^2 - a^2}} =$$

$$\int \sec u du =$$

$$\int \sec u \tan u du =$$

$$\int \cos^2 u du =$$

$$\int \csc^2 u du =$$

$$\int \tan u du =$$

$$\int \csc u du =$$

$$\int e^u du =$$

$$\int a^u du =$$

$$\int u^{-1} du =$$

1. 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
-

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

- a) $\frac{1}{2} \ln|x^2 - 1| + C$ b) $\frac{1}{2}(x^2 - 1)^2 + C$ c) $\frac{x^2}{2} - \ln|x| + C$
d) $x - \frac{1}{x} + C$ e) $1 + x^{-2} + C$
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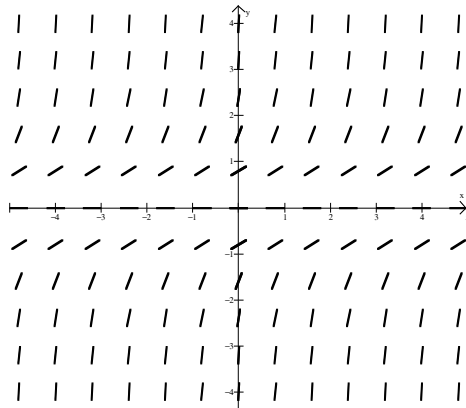
3. If $\frac{dy}{dx} = \sin x \cos^3 x$ and if $y = 1$ when $x = \pi$, what is the value of y when $x = 0$?

- a) -2 b) -1 c) 0 d) 1 e) 2
-

4. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx =$

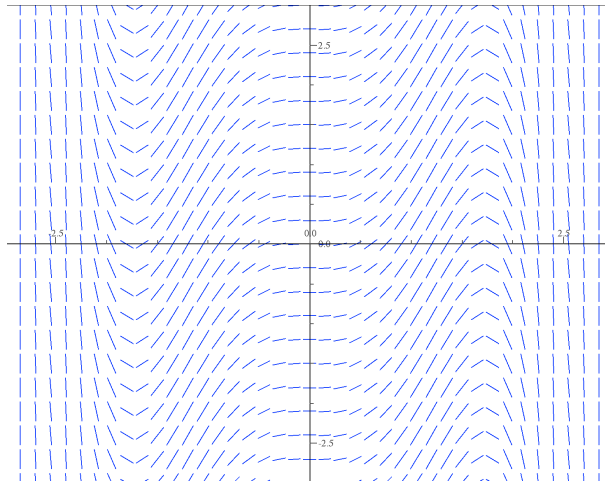
- a) $2e^{\sqrt{x}} + c$ b) $\frac{1}{2}e^{\sqrt{x}} + c$ c) $e^{\sqrt{x}} + c$
 d) $2\sqrt{x} e^{\sqrt{x}} + c$ e) $\frac{e^{\sqrt{x}}}{2\sqrt{x}} + c$
-

5. Which of the following differential equations corresponds to the slope field shown in the figure below?



- a) $\frac{dy}{dx} = x^2 y$ b) $\frac{dy}{dx} = y^2$ c) $\frac{dy}{dx} = x^2$
 d) $\frac{dy}{dx} = \frac{x^2}{y^2}$ e) $\frac{dy}{dx} = \frac{y}{x}$
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6. Which of the following equations might be the solution to the slope field shown in the figure below?



- a) $y = 4x - x^3$ b) $y = x^3 - 4x$ c) $y = 4x^4 - x^6$
 d) $y = x^3 - 15x^5$ e) $y = -\csc x$

7. Identify is the mistake (if any) in this process:

$$\frac{dy}{dx} = 6x^2y^2$$

Step 1: $\frac{1}{y^2} dy = 6x^2 dx$

Step 2: $\ln|y^2| = 2x^3 + c$

Step 3: $y^2 = e^{2x^3+c}$

Step 4: $y = \pm\sqrt{ke^{2x^3}}$

- a) Step 1 b) Step 2 c) Step 3
 d) Step 4 e) There is no mistake.

8. $\int \left(\frac{z^4 - 6z - 5}{3z^2} \right) dz$

9. $\int \frac{x^5}{(x^2 - 1)^{5/2}} dx$

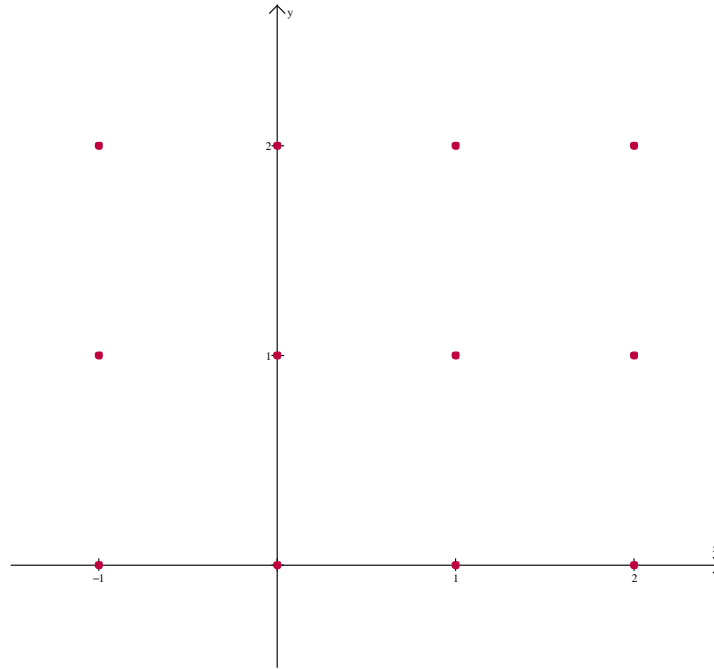
10. $\int \left(7x^3 - x \cos^2(x^2) + \frac{\cos x}{e^{\sin x}} \right) dx$

11. $\int \left(x \sqrt{4x^2 + 1} \right) dx$

12. The acceleration of a particle is described by $a(t) = 36t^2 - 12t + 8$. Find the distance equation for $x(t)$ if $v(1) = 1$ and $x(1) = 3$.

13. Given the differential equation, $\frac{dy}{dx} = \frac{2x}{y}$

a. On the axis system provided, sketch the slope field for the $\frac{dy}{dx}$ at all points plotted on the graph.



b. If the solution curve passes through the point $(0, 1)$, sketch the solution curve on the same set of axes as your slope field.

c. Find the equation for the solution curve of $\frac{dy}{dx} = x^2y + x^2$ given that $y(3) = 0$