AP Calculus AB '20-21
Anti-Derivative MCQ Test v2

Name____________________________

Score____________

1. Which of the following statements are true?

I. $\int (\csc u)\, dx = \ln|\csc u - \cot u| + c$

II. $\int \cos^2 u\, du = \frac{1}{2}u - \frac{1}{4}\cos 2u + c$

III. $\int \left(\frac{1}{\sqrt{4-x^2}}\right) dx = \frac{1}{2}\sin^{-1}\frac{x}{2} + c$

a) I only b) II only c) III only d) I and III e) II and III only

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2. $\int \left(x^3 + 2 + \frac{1}{x^2+9}\right) dx =$

a) $\frac{x^4}{4} + 2x + \ln\left|x^2+9\right| + C$

b) $x^4 + 2 + \frac{1}{3}\tan^{-1}\frac{x}{3} + C$

c) $4 + 2x + \frac{1}{3}\ln\left|x^2+9\right| + C$

d) $\frac{x^4}{4} + 2x + \frac{1}{3}\tan^{-1}\frac{x}{3} + C$

e) $\frac{x^4}{4} + 2x + \frac{3}{x^3+3} + C$

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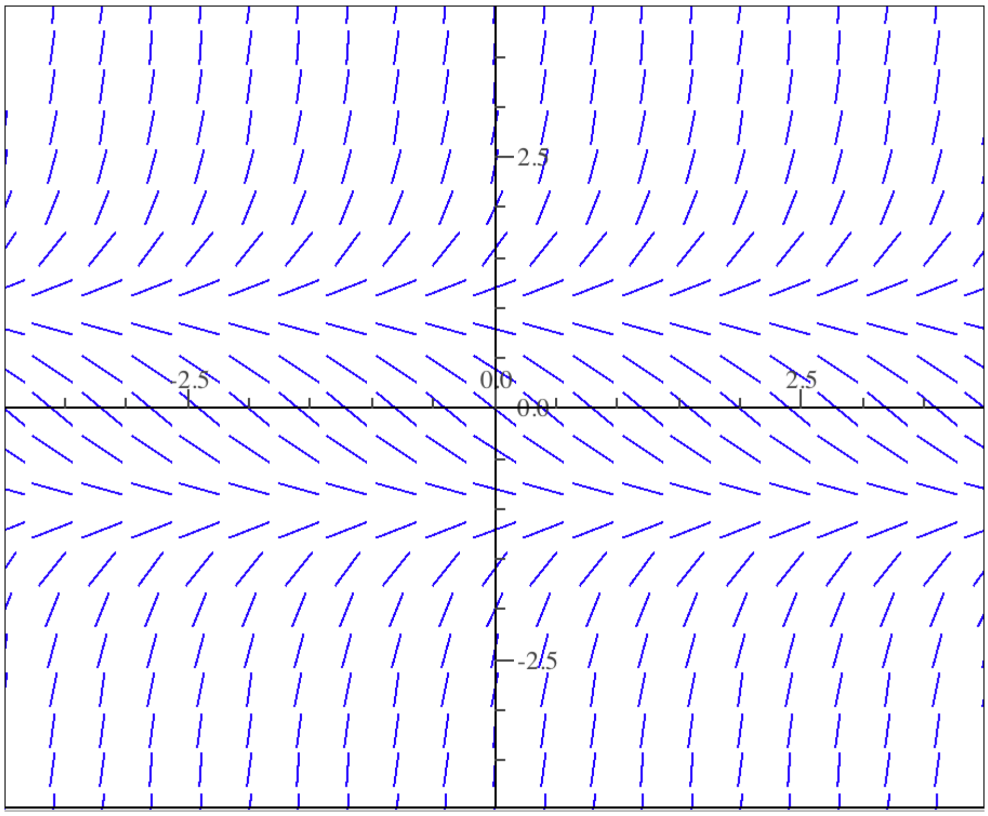
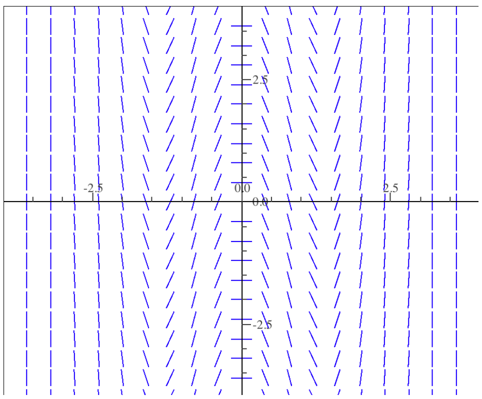
3. Which of the following differential equations corresponds to the slope field shown in the figure below?

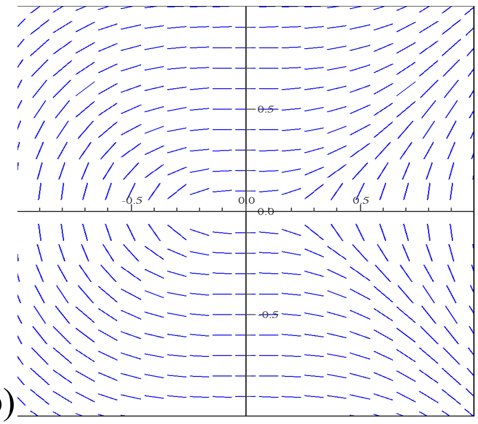


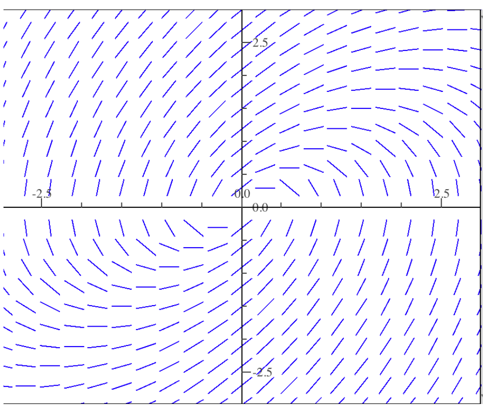
a) $\frac{dy}{dx} = 1 - y^3$ b) $\frac{dy}{dx} = y^2 - 1$ c) $\frac{dy}{dx} = -\frac{x^2}{y^2}$

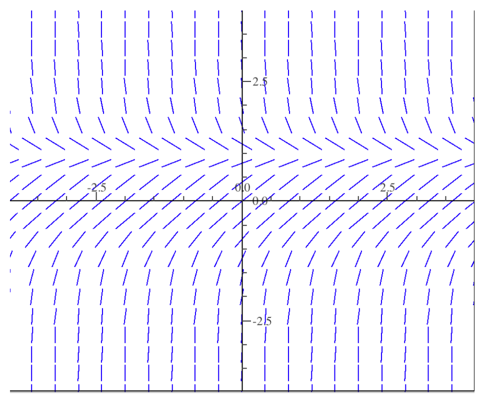
d) $\frac{dy}{dx} = x^2 y$ e) $\frac{dy}{dx} = x + y$

4. Which of the slope field shown below corresponds to $\dfrac{dy}{dx} = 1 - \dfrac{x}{y}$?

a) 

b) 

c) 

d) 

5. Find the particular solution to $(x^2+1)\frac{dy}{dx}=y$, where $y(0)=2$.

a) $y=2e^{\tan^{-1}x}$ b) $y=e^{\tan^{-1}x}$ c) $y=e^{(\tan^{-1}x)\ln 2}$

d) $y=\sqrt{2\tan^{-1}x}$ e) $y=\sqrt{2\tan^{-1}x+4}$

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6. A particle moves along the x-axis so that at any time $t\geq 0$, it acceleration is given $a(t)=-4\sin(2t)$. If $v(0)=7$ and $x(0)=0$, then the particle's position equation is

a) $x(t)=\sin(2t)+5t$ b) $x(t)=\sin(2t)+7t$

c) $x(t)=\sin(2t)+9t$ d) $x(t)=16\sin(2t)+7t$

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

a. $2\sqrt{x^3+3}+c$ b. $\frac{3}{2}\sqrt{x^3+3}+c$ c. $\sqrt{x^3+3}+c$

d. $\ln\sqrt{x^3+3}+c$ e. $\ln\left(x^3+3\right)+c$

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8. For $\int \cos x \sin^3 x\ dx$, the correct u-substitution is

a) $u=\cos x$

b) $u=\sin x$

c) $u=x^3$

d) $u=\cos^3 x$

e) use the half-angle formulas

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

$$\frac{dy}{dx} = xy + x$$

Step 1: $\frac{1}{y+1} dy = x dx$

Step 2: $\ln|y+1| = x^2 + c$

Step 3: $|y+1| = e^{x^2} + c$

Step 4: $y = e^{x^2} + c$

a) Step 1 b) Step 2 c) Step 3

d) Step 4 e) There is no mistake.