Calculus AB Course Review: Unit 6 Differential Equations MC WS #1

1. If $a(t) = 4t - 1$ and $v(1) = 3$, then $v(t)$ equals

(A) $2t^2 - t$ (B) $2t^2 - t + 1$ (C) $2t^2 - t + 2$
(D) $2t^2 + 1$ (E) $2t^2 + 2$

2. If $\frac{dy}{dx} = \frac{y}{2\sqrt{x}}$ and $y = 1$ when $x = 4$, then

(A) $y^2 = 4\sqrt{x} - 7$ (B) $\ln y = 4\sqrt{x} - 8$ (C) $\ln y = \sqrt{x - 2}$
(D) $y = e^{\sqrt{x}}$ (E) $y = e^{\sqrt{x}-2}$

3. If $\frac{dy}{dx} = e^y$ and $y = 0$ when $x = 1$, then

(A) $y = \ln |x|$ (B) $y = \ln |2 - x|$ (C) $e^{-y} = 2 - x$
(D) $y = -\ln |x|$ (E) $e^{-y} = x - 2$

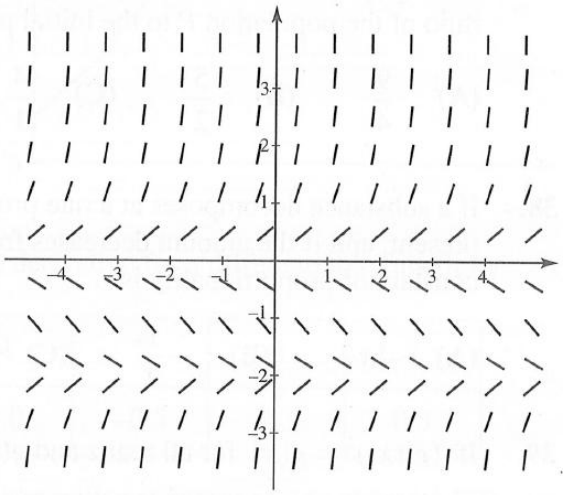
4. If $\frac{dy}{dx} = \frac{x}{\sqrt{9+x^2}}$ and $y = 5$ when $x = 4$, then y equals

(A) $\sqrt{9+x^2} - 5$ (B) $\sqrt{9+x^2}$ (C) $2\sqrt{9+x^2} - 5$

(D) $\frac{\sqrt{9+x^2}+5}{2}$ (E) none of these

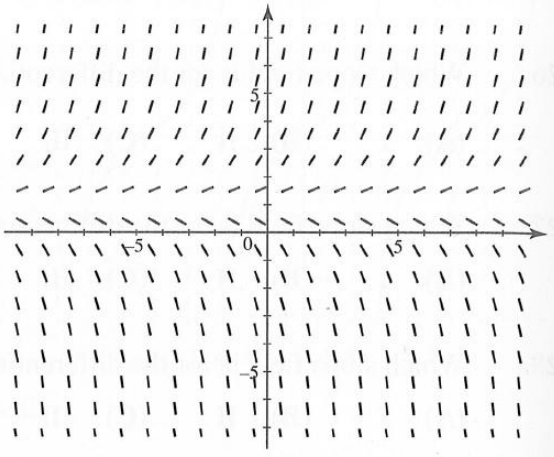
5. Which differential equation has the slope field shown?

(A) $y' = y(y+2)$
(B) $y' = x(y+2)$
(C) $y' = xy + 2$
(D) $y' = \frac{x}{y+2}$
(E) $y' = \frac{y}{y+2}$



6. Which function is a possible solution of the slope field shown?

(A) $y = 1 - \frac{1}{x}$
(B) $y = 1 - \ln x$
(C) $y = 1 + \ln x$
(D) $y = 1 + e^x$
(E) $y = 1 + \tan x$



7. A cup of coffee at temperature 180°F is placed on a table in a room at 68°F. The d.e. for its temperature at time t is $\frac{dy}{dt} = -0.11(y - 68)$; $y(0) = 180$. After 10 min the temperature (in °F) of the coffee is

(A) 96 (B) 100 (C) 105 (D) 110 (E) 115

8. Solutions of the differential equation $y\,dy = x\,dx$ are of the form

(A) $x^2 - y^2 = C$ (B) $x^2 + y^2 = C$ (C) $y^2 = Cx^2$
(D) $x^2 - Cy^2 = 0$ (E) $x^2 = C - y^2$

9. The solution curve of $y' = y$ that passes through point (2, 3) is

(A) $y = e^x + 3$ (B) $y = \sqrt{2x + 5}$ (C) $y = 0.406e^x$
(D) $y = e^x - (e^2 + 3)$ (E) $y = e^x/(0.406)$

10. According to Newton's law of cooling, the temperature of an object decreases at a rate proportional to the difference between its temperature and that of the surrounding air. Suppose a corpse at a temperature of 32°C arrives at a mortuary where the temperature is kept at 10°C. Then the differential equation satisfied by the temperature T of the corpse t hr later is

(A) $\frac{dT}{dt} = -k(T - 10)$ (B) $\frac{dT}{dt} = k(T - 32)$ (C) $\frac{dT}{dt} = 32e^{-kt}$

(D) $\frac{dT}{dt} = -kT(T - 10)$ (E) $\frac{dT}{dt} = kT(T - 32)$

11. If the corpse in Question 51 cools to 27°C in 1 hr, then its temperature (in °C) is given by the equation

(A) $T = 22e^{0.205t}$ (B) $T = 10e^{1.163t}$ (C) $T = 10 + 22e^{-0.258t}$

(D) $T = 32e^{-0.169t}$ (E) $T = 32 - 10e^{-0.093t}$