Unit 7 AP Cumulative Review Problems

1. If $\frac{dy}{dx} = 2(1+y^2)x$, then

(A) $y = x^2 + C$ (B) $\tan^{-1} y = x^2 + C$

(C) $y = Ce^{x^2}$ (D) $y = \sqrt{e^{x^2}} + C$

$dy = 2(1+y^2)x\,dx$

$\frac{dy}{1+y^2} = 2x\,dx$

$\int \frac{1}{1+y^2}dy = \int 2x\,dx$

$\arctan y = \frac{2x^2}{2} + C$

$\arctan y = x^2 + C$

2. If at every point (x, y) on the graph of a function f, the slope of the tangent line is given by $y = 3 - 4x$ and if the point $(2, 3)$ is on the graph of f, then

(A) $f(x) = -5x + 7$ (B) $f(x) = -2x^2 + 3x - 11$

(C) $f(x) = -2x^2 + 3x$ (D) $f(x) = -2x^2 + 3x + 5$

$\frac{dy}{dx} = 3 - 4x$

$y = \int 3 - 4x\,dx$

$y = 3x - \frac{4x^2}{2} + C$ ← plug in (2,3)

$3 = 3(2) - 2(2)^2 + C$

$3 = 6 - 8 + C$

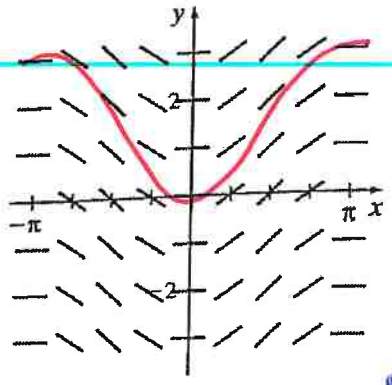
$3 = -2 + C$

$5 = C$

$y = 3x - 2x^2 + 5$

$y = -2x^2 + 3x + 5$

5. The slope field shown in the figure represents the solutions to which differential equation?



(A) $\frac{dy}{dx} = -x^4$ (B) $\frac{dy}{dx} = \cos x$

(C) $\frac{dy}{dx} = \sin x$ (D) $\frac{dy}{dx} = x^3$

$y = \int \sin x\,dx$

$y = -\cos x + C$