Friday, February 27

Clicker Questions

Clicker Question 2

A differential equation

Find all functions $y = y(\theta)$ that satisfy the equation

$$\frac{y'}{\cos\theta} = \tan\theta + 1.$$

A. $y = \ln|\sec\theta + \tan\theta| + C$

B. $y = \ln|\sin\theta| + C$

C. $y = \sin\theta - \cos\theta + C$

D. $y = \ln|\sin\theta| + \theta + C$

E. $y = \sin\theta + \cos\theta + C$

Old hat

The equation is the same as

$$\begin{aligned} y' &= (\tan\theta + 1)\cos\theta \\ &= \sin\theta + \cos\theta, \end{aligned}$$

so this problem is really the same as

$$\int (\cos\theta + \sin\theta)\, d\theta.$$

Clicker Question 2

A differential equation

Find all functions $y = y(\theta)$ that satisfy the equation

$$\frac{y'}{\cos\theta} = \tan\theta + 1$$

and the initial condition $y(\pi) = 3$.

A. $y = \sin\theta - \cos\theta + 4$

B. $y = \sin\theta - \cos\theta + 2$

C. $y = \sin\theta - \cos\theta + 3\theta + C$ for any C

D. $y = \sin\theta - \cos\theta + C$ for any C

E. $y = \sin\theta - \cos\theta + 3\theta$

Old hat

If $y(\theta) = \sin\theta - \cos\theta + C$ and $y(\pi) = 3$, then

$$\begin{aligned} 3 = y(\pi) &= \sin\pi - \cos\pi + C \\ &= 0 - (-1) + C \\ &= 1 + C, \end{aligned}$$

and so C must equal 2.

Clicker Question 3

A separable differential equation

Solve the differential equation $(y^2x - y^2)y' = 1$.

A. $y = \dfrac{1}{\ln|x-1| + C}$

B. $y = \sqrt[3]{3\ln|x-1| + C}$

C. $y = \sqrt[3]{\dfrac{3x^2}{2} - 3x + C}$

D. $y = \dfrac{2}{2x - x^2 + C}$

E. none of the above