## Wednesday, April 1

# **Clicker Questions**

# **Clicker Question 1**

## Finding a Maclaurin series

What is the Maclaurin series for the function  $f(x) = e^x$ ?



#### The calculation

The Maclaurin series for a function f(x) is

$$\sum_{n=0}^{\infty} \frac{f^{(n)}(0)}{n!} x^n.$$

In this case,  $f^{(n)}(x) = e^x$  for every real number x, and so  $f^{(n)}(0) = e^0 = 1$  always.

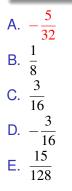
# **Clicker Question 2**

#### Finding a Taylor series

The Taylor series for the function  $f(x) = 1/(x-5)^3$  centred at a = 7 has the form

 $c_0 + c_1(x-7) + c_2(x-7)^2 + c_3(x-7)^3 + c_4(x-7)^4 + \cdots$ 

The five numbers below are  $c_0, c_1, c_2, c_3, c_4$  in some order. Which one is  $c_3$ ?



#### The calculation

The Taylor series at *a* for a function f(x) is

$$\sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!} (x-a)^n,$$

so  $c_3 = f^{(3)}(7)/3! = f^{((7))}/6$ . Since  $f^{((7))}(x) = (-3)(-4)(-5)/(x-5)^6$ 

we get 
$$f'''(7) = (-60)/2^6 = -15/16$$
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