17

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

SCAN 1 — Quiz #12 — 11' *February 27, 2019*

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Exercise 1. Fill in the blanks with the simplest equivalent. No justifications required.

$\cos\big(\ln(\cos(x))\big) - 1 \underset{x\to 0}{\sim} \dfrac{-(\ln(\cos(x)))^2}{2} \underset{x\to 0}{\sim} \dfrac{-(\cos(x)-1)^2}{2} \underset{x\to 0}{\sim} \dfrac{-x^4}{8}$ ✓

$\dfrac{e^{\cosh(x)} - e}{\sinh(x)} \underset{x\to 0}{\sim} \dfrac{e(e^{\cosh(x)-1} - 1)}{\sinh(x)} \underset{x\to 0}{\sim} \dfrac{e(\cosh(x)-1)}{\sinh(x)} \underset{x\to 0}{\sim} \dfrac{-ex}{2}$ ✓

9

$\arccos(x) - \arccos(1/2) \underset{x\to 1/2}{\sim} \underbrace{\dfrac{-1}{\sqrt{1-(\frac{1}{2})^2}}}_{\arccos'(\frac{1}{2})}(x-\frac{1}{2}) \underset{x\to\frac{1}{2}}{\sim} \dfrac{-1}{\sqrt{\frac{3}{4}}}(x-\frac{1}{2}) \underset{x\to\frac{1}{2}}{\sim} \dfrac{-2}{\sqrt{3}}(x-\frac{1}{2})$ ✓

Exercise 2. Fill in the blanks:

$\big(1-2x+3x^2+o(x^2)\big) + \big(x-3x^2+o(x^3)\big) \underset{x\to 0}{=} 1 - x + o(x^2)$ ✓

$\big(1-2x+3x^2+o(x^2)\big)\big(x-3x^2+o(x^3)\big) \underset{x\to 0}{=} x - 3x^2 - 2x^2 + 6x^3 + 3x^3 + o(x^3)$

$\underset{x\to 0}{=} x - 5x^2 + 9x^3 + o(x^3)$

6

$\Big(1+x+\dfrac{x^2}{2}+o(x^2)\Big)\Big(1-x+\dfrac{x^2}{2}-\dfrac{x^3}{6}+o(x^3)\Big) \underset{x\to 0}{=} 1 - x + \dfrac{x^2}{2} + x - x^2 + \dfrac{x^2}{2} + o(x^2)$

$\underset{x\to 0}{=} 1 + o(x^2)$ ✓

Exercise 3. True or false? no justifications required.

2

$\cos(x^2) \underset{x\to 0}{\sim} e^x + 10x^5$ False

$\ln(5x) \underset{x\to+\infty}{=} o(\sqrt{x})$ True ✓