

Math191 Practice Class Test 2009

- There will be a Class Test at 9 a.m. on Friday 13 November 2009. The format will be similar to this.
- Solutions to this mock test will be available on VITAL from Tuesday 10 November 2009.
- The exam will be **45 minutes** long.
- **FULL MARKS** will be given for complete answers to **ALL** seven questions. The marks available for each question are indicated in square brackets in the right margin.

1. State the domain and range of the following functions:

a) $f(x) = 1 + \sin(2x)$

b) $f(x) = |x| + 2$

[6 marks]

2. Let

$$f(x) = \frac{x - 3}{x + 1}.$$

Find the inverse function $f^{-1}(x)$. State the domain and range of f (NOT the inverse function) and sketch its graph, marking any horizontal or vertical asymptotes, and any zeros.

[10 marks]

3.

a) Find the exact value of $\sin^{-1}\left(-\frac{1}{2}\right)$.

b) Give the general solution of the equation $\sin x = -\frac{1}{2}$.

[6 marks]

4. In this question, full marks will only be awarded for *exact* answers (in terms of π , $\sqrt{3}$ etc.) and not for approximations to any number of decimal places.

a) Convert $(2, 5\pi/3)$ from polar to Cartesian coordinates.

b) Convert $(-2, 2)$ from Cartesian to polar coordinates.

[5 marks]

5. Determine whether the following limits exist. Where they exist, evaluate them.

a) $\lim_{x \rightarrow \pm\infty} \frac{2x^2 + 1}{x^2 + x - 2}$

b) $\lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{x^2 + 2x - 3}$

[6 marks]

6.

Differentiate the following functions. In part a), also find the tangent line through the point $(1, 1)$.

a) $f(x) = 2x^3 + 3x - 4$

b) $f(x) = \tan(2x)$

c) $f(x) = \frac{\sin x}{x^2}$

[11 marks]

7.

a) Find the Maclaurin series of $f(x) = \ln(1 - x)$

b) Hence, or otherwise, find the Maclaurin series of $\ln(1 - x^2)$

[6 marks]