

TRIGONOMETRY PRACTICE EXAM 2

KYLE BRODER - ANU MSI 2018

The contents of this examination require an understanding of the elementary function theory material that was covered in Chapters 3.1-3.8 of the notes.

There are no permitted materials for this test. That is, you are not permitted any cheat notes, calculators or resources other than a pen/pencil, eraser, sharpener, ruler and water bottle.

There is to be no collaboration on this examination and any attempts of communication will result in a nullified score. You are permitted 5 minutes of reading time and 90 minutes of writing time. There is a total of 100 available marks with a redemption question at the end which is worth 20 bonus marks. It is recommended that you use the reading time to ask the invigilator about any issues regarding the format of the test, the problems or other issues. No hints will be given. Best of luck!

Name: _____

Grade: _____/100

Question 1. (10 marks). Solve the equation

$$\sin x = \sqrt{3} \cos x,$$

for $0 \leq x \leq 2\pi$.

Question 2. (15 marks). Let f be the function defined by

$$f(x) = 3 \tan \left(\frac{1}{2}x + \pi \right).$$

Sketch the graph of f on a suitable domain.

Question 3. (15 marks). Sketch the graph of

$$f(x) = \cos^{-1}(\pi + 2x) - 3.$$

Question 4. (20 marks). Prove that

$$\frac{\tan^2 x \sin^2 x}{\tan^2 x - \sin^2 x} = 1.$$

Question 5. (15 marks). Let $f(x) = 1 - 2 \sin x$. Describe the transformations necessary to map $f(x)$ to

$$\tilde{f}(x) = 4 + 3 \sin(x - \pi).$$

Question 6. (25 marks). Determine the exact value of

$$\cos\left(\frac{\pi}{5}\right).$$