TRINITY COLLEGE

Mathematics Specialist Units 1,2
Test 4 2018

Section 1 Calculator Free

Trigonometry

STUDENT'S NAME _____

DATE: Thursday 26 July **TIME:** 28 minutes **MARKS**: 28

INSTRUCTIONS:
Standard Items: Pens, pencils, drawing templates, eraser

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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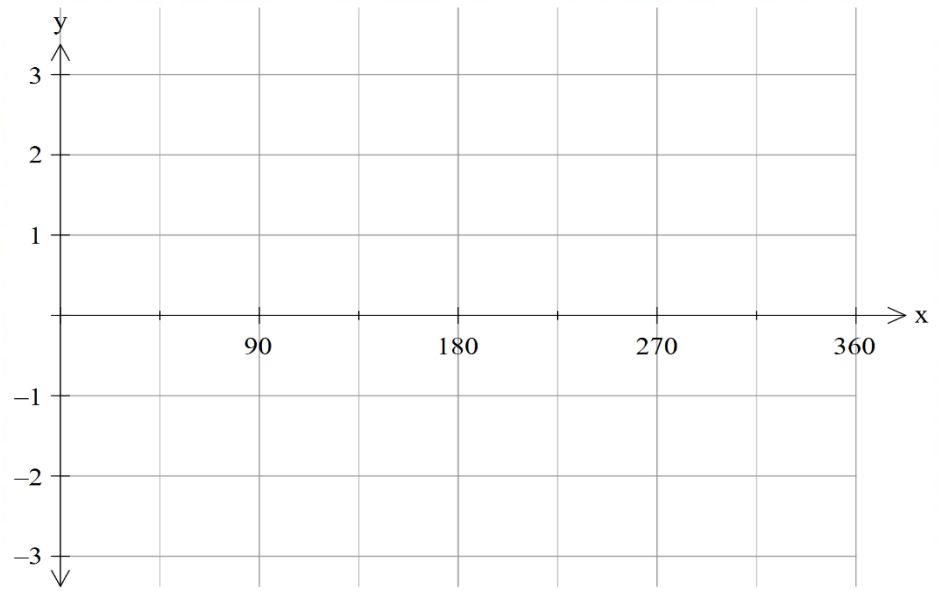
1. (3 marks)

Determine the exact value of $\cos 105°$.

2. (9 marks)

(a) For the function $y = 2\sin(x - 90^\circ)$

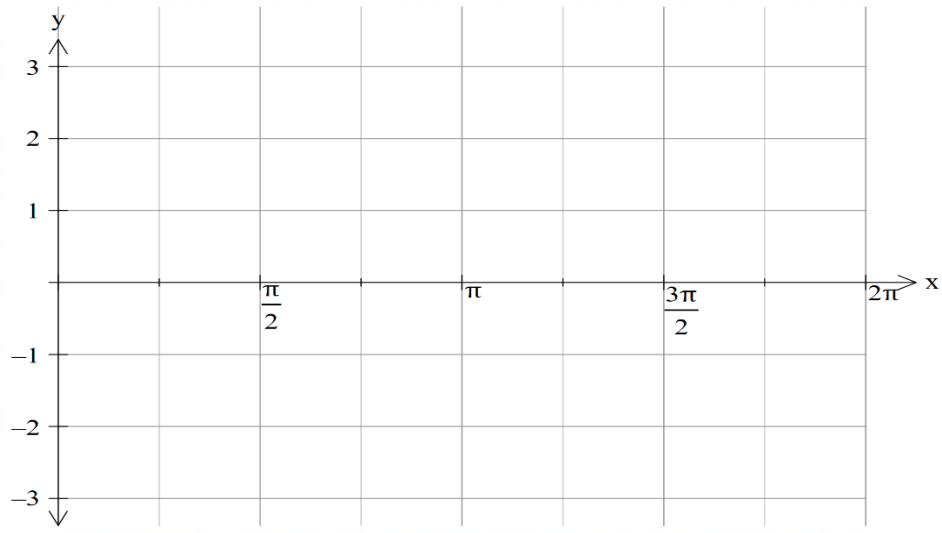
(i) sketch the function on the axes below. [2]



(ii) determine the amplitude and change of phase. [2]

(b) For the function $y = -3\cos 2x$

(i) sketch the function on the axes below. [3]



(ii) determine the amplitude and period. [2]

3. (3 marks)

Prove $\cot\theta(\cos\theta - \sec\theta) = -\sin\theta$

4. (9 marks)

(a) Solve $2\sin x\cos x = \cos x \qquad -180° \le x \le 180°$ [4]

(b) $\cos 2x\cos\frac{\pi}{6} - \sin 2x\sin\frac{\pi}{6} = 0.5 \qquad 0 \le x \le 2\pi$ [5]

5. (5 marks)

Solve $2\cos^2\theta - 7\cos\theta - 4 = 0$ θ *radians*

TRINITY COLLEGE

Mathematics Specialist Units 1,2
Test 4 2018

Section 2 Calculator Assumed

Trigonometry

STUDENT'S NAME _____

DATE: Thursday 26 July **TIME:** 25 minutes **MARKS**: 25

INSTRUCTIONS:

Standard Items: Pens, pencils, drawing templates, eraser

Special Items: Three calculators, notes on one side of a single A4 page (these notes to be handed in with this assessment)

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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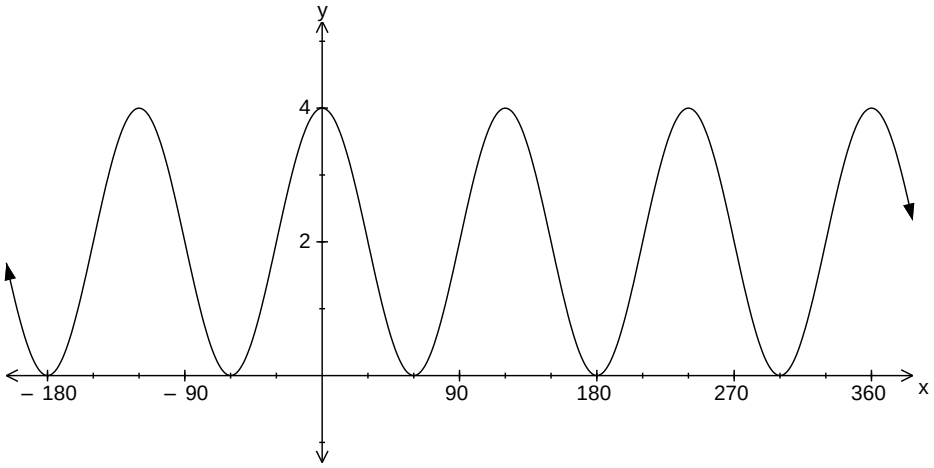
6. (2 marks)

Determine the equation of the function shown below.



7. (7 marks)

Given $\sin\theta = \frac{p}{q}$ where $\frac{\pi}{2} < \theta < \pi$, determine

(a) $\tan\theta$ [2]

(b) $\sin 2\theta$ [2]

(c) $\cos\frac{\theta}{2}$ [3]

8. (9 marks)

(a) Express $4\cos x - 5\sin x$ in the form $R\cos(x+\alpha)$ [3]

(b) Determine the maximum value of $4\cos x - 5\sin x$ and the smallest positive value of x when the maximum value occurs. [3]

(c) Solve $4\cos x - 5\sin x = \sqrt{20.5}$ for $0 \le x \le 2\pi$ [3]

9. (7 marks)

(a) Prove $\frac{1-\tan^2 x}{1+\tan^2 x} = \cos 2x$ [3]

(b) Hence, or otherwise, show that if $\cos 2\alpha = \tan^2 \beta$ then $\cos 2\beta = \tan^2 \alpha$. [4]