Trigonometry – 2020 A2

1.

It is given that $3 \sin 2\theta = \cos \theta$ where θ is an angle such that $0° < \theta < 90°$.

(a) Find the exact value of $\sin \theta$. [2]
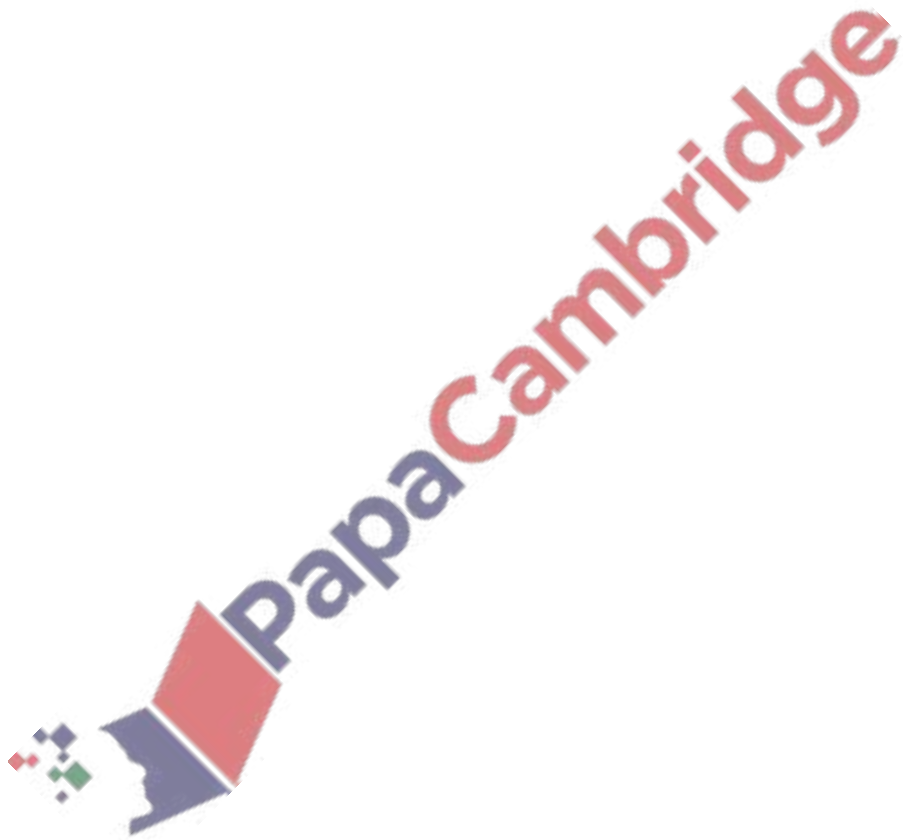
(b) Find the exact value of $\sec \theta$. [2]

(c) Find the exact value of $\cos 2\theta$. [2]

2.
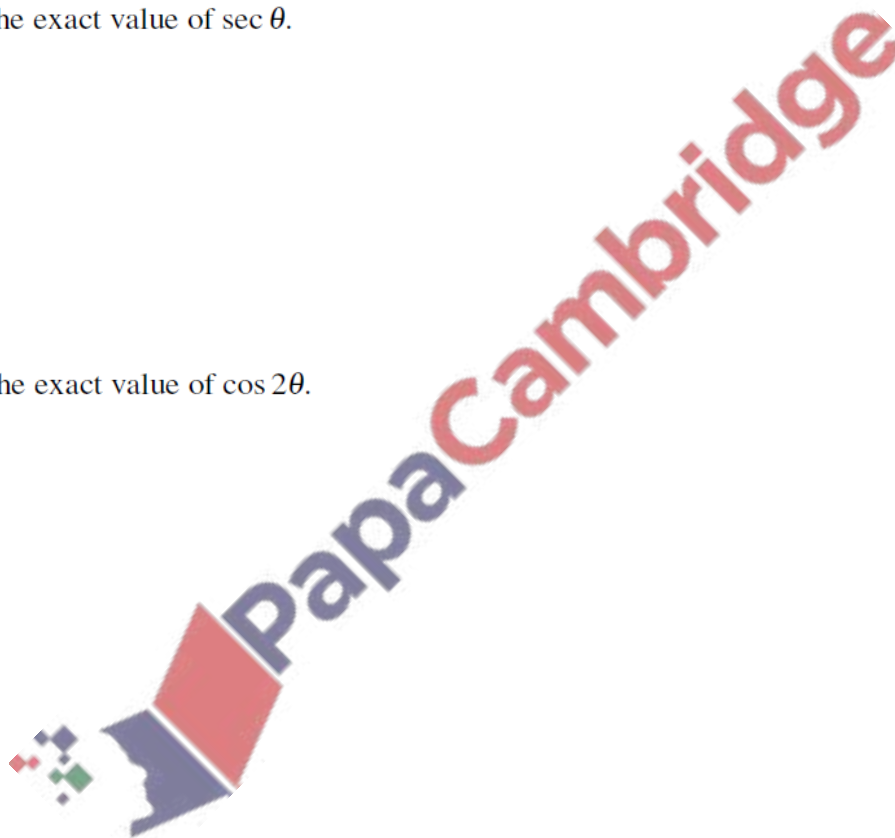
Solve the equation $7 \cot \theta = 3 \operatorname{cosec} \theta$ for $0° < \theta < 90°$. [3]
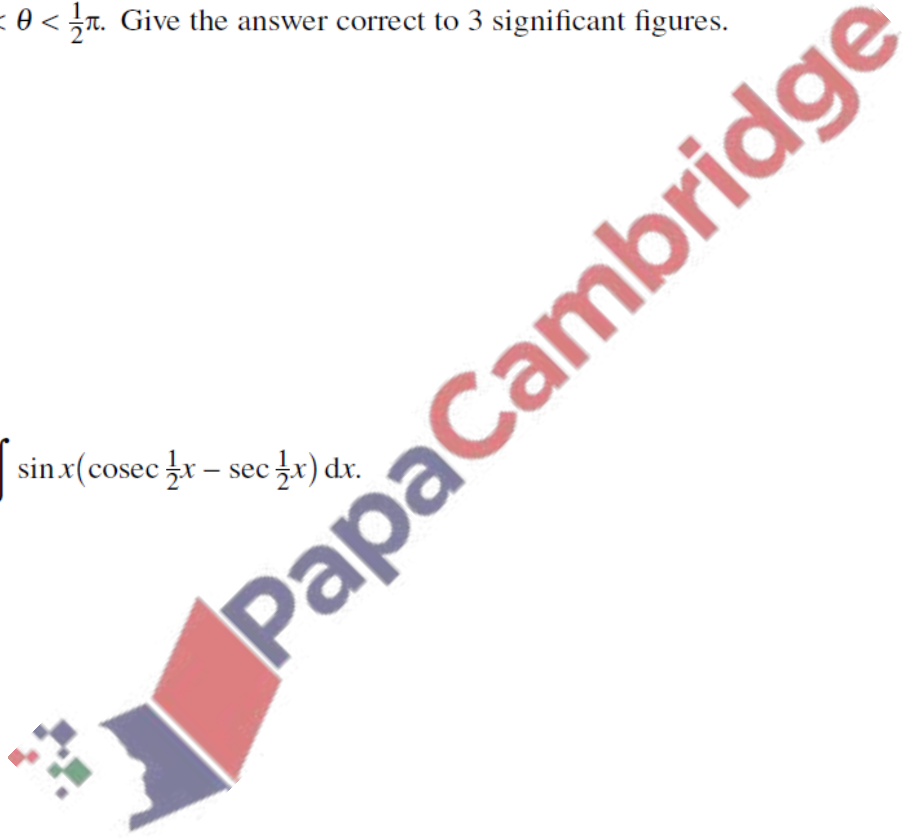
(a) Prove that

$$\sin 2\theta(\operatorname{cosec}\theta - \sec\theta) \equiv \sqrt{8}\cos\left(\theta + \tfrac{1}{4}\pi\right).$$

[5]

(b) Solve the equation

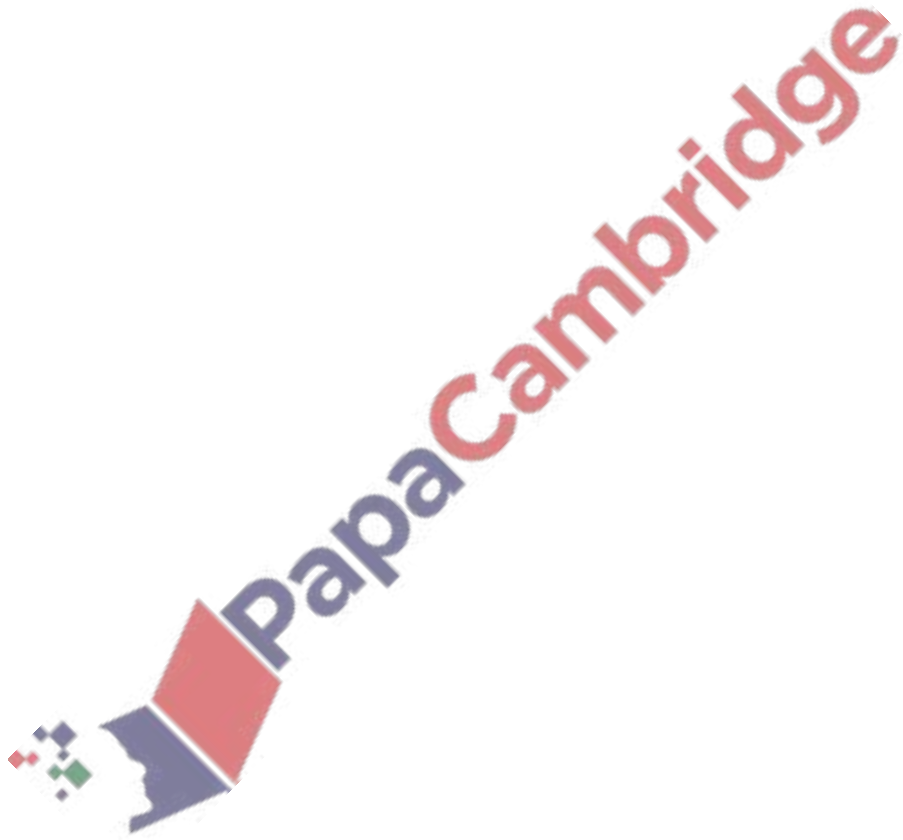$$\sin 2\theta(\operatorname{cosec}\theta - \sec\theta) = 1$$

for $0 < \theta < \tfrac{1}{2}\pi$. Give the answer correct to 3 significant figures.

[2]

(c) Find $\int \sin x\left(\operatorname{cosec}\tfrac{1}{2}x - \sec\tfrac{1}{2}x\right)\mathrm{d}x.$

[3]

(a) Show that $3\sin 2\theta \cot \theta \equiv 6\cos^2 \theta$. [2]

(b) Solve the equation $3\sin 2\theta \cot \theta = 5$ for $0 < \theta < \pi$. [3]

5.

Solve the equation $2\sin(\theta + 30°) + 5\cos\theta = 2\sin\theta$ for $0° < \theta < 90°$. [4]