

Instructions: Show all work for each of the following in the space provided.

[52 Marks]

1. (a) Convert the following to radian measure: 70°

[2]

(b) Convert the following to degree measure: 2.85 rad

[2]

(c) Determine the principal angle of $\frac{-37\pi}{4}$ in radians.

[2]

2. Solve the following trigonometric equation: $\sin x(1 + 2 \cos x) = 0$, $-4\pi \leq x < 2\pi$

[5]

3. Without using a calculator, evaluate the following:

[12]

(Must include a separate sketch for each angle)

$$5 \csc\left(\frac{31\pi}{6}\right) - 3 \sec^2\left(\frac{-23\pi}{4}\right) + \sqrt{3} \tan\left(\frac{-16\pi}{3}\right) - \sin\left(\frac{11\pi}{2}\right) - 5 \cos(58\pi)$$

4. Solve each of the following trigonometric equations:

(a) $3\sin^2 x - 7\sin x = 6$, $-360^\circ \leq x \leq 720^\circ$

[6]

(b) $(2\cos\theta - 1)^2 + 9\cos\theta = 2\cos\theta(\cos\theta + 1)$, $-4\pi \leq \theta \leq 2\pi$

[8]

5. The helicopter shown has blades that are 12 m in length.



(a) If the blades made 380 revolutions in a 50 second interval, determine the angular velocity of the blades in **radians/second**?

[3]

(b) Given the conditions from part (a) determine **how far** the tip of one of these blades travels after 15 seconds has passed.

[3]

(c) Given that the helicopter has an internal gauge indicating that the blades are rotating at 725 km/h, determine the angular velocity of the blades in **radians/second**.

[3]

6. Determine the area of the shaded segment shown below:

[6]

