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VCE Specialist Mathematics ½
Trigonometry II [3.2]
Test Solutions

22 Marks. 1 Minute Reading. 18 Minutes Writing.

Results:

Test Questions	_____ / 22

Section A: Test Questions (22 Marks)

Question 1 (4 marks)

Tick whether the following statements are **true** or **false**.

	True	False
a. On the unit circle, the value of sin is represented by the y-value of the unit circle whereas the value of tan is represented by the gradient of the projection.	✓	
b. If you change the value of x by the period in a sin function, the angle changes by 2π.	✓	
c. For a particular solution, the trigonometric equation must have a restricted domain.	✓	
d. $\tan(7\pi + \theta) = \tan(\theta)$.	✓	
e. For sin and cos functions, the amplitude is always the **coefficient** of sin and cos. It's the size of the coefficient.		✓
f. We should start sketching the function when the angle is equal to 0.	✓	
g. The y-value of the inflexion of the tangent graph is always given by the vertical translation of the function.	✓	
h. To find the vertical asymptote of any tangent function, we simply let the angle equal to $\frac{\pi}{2}$.	✓	

Space for Personal Notes

Question 2 (3 marks)

It is known that $\cos(a) = -\frac{1}{5}$ where a is a third quadrant angle.

Evaluate the following:

a. $\cos(\pi + a)$. (1 mark)

$\frac{1}{5}$

b. $\sin(\pi + a)$. (2 marks)

$\frac{\sqrt{24}}{5}$

Space for Personal Notes

Question 3 (5 marks)

Consider the equation below.

$$-2\cos\left(2x+\frac{\pi}{6}\right)+1=0$$

a. Solve for the value(s) of x. (4 marks)

```
Solve[-2 Cos[2 x + π / 6] + 1 == 0, x] // Expand
```

$$\left\{\left\{x \to -\frac{\pi}{4} + \pi\, c_1 \text{ if } c_1 \in \mathbb{Z}\right\}, \left\{x \to \frac{\pi}{12} + \pi\, c_1 \text{ if } c_1 \in \mathbb{Z}\right\}\right\}$$

b. Solve for the value(s) of x where $x \in [0,2\pi]$. (1 mark)

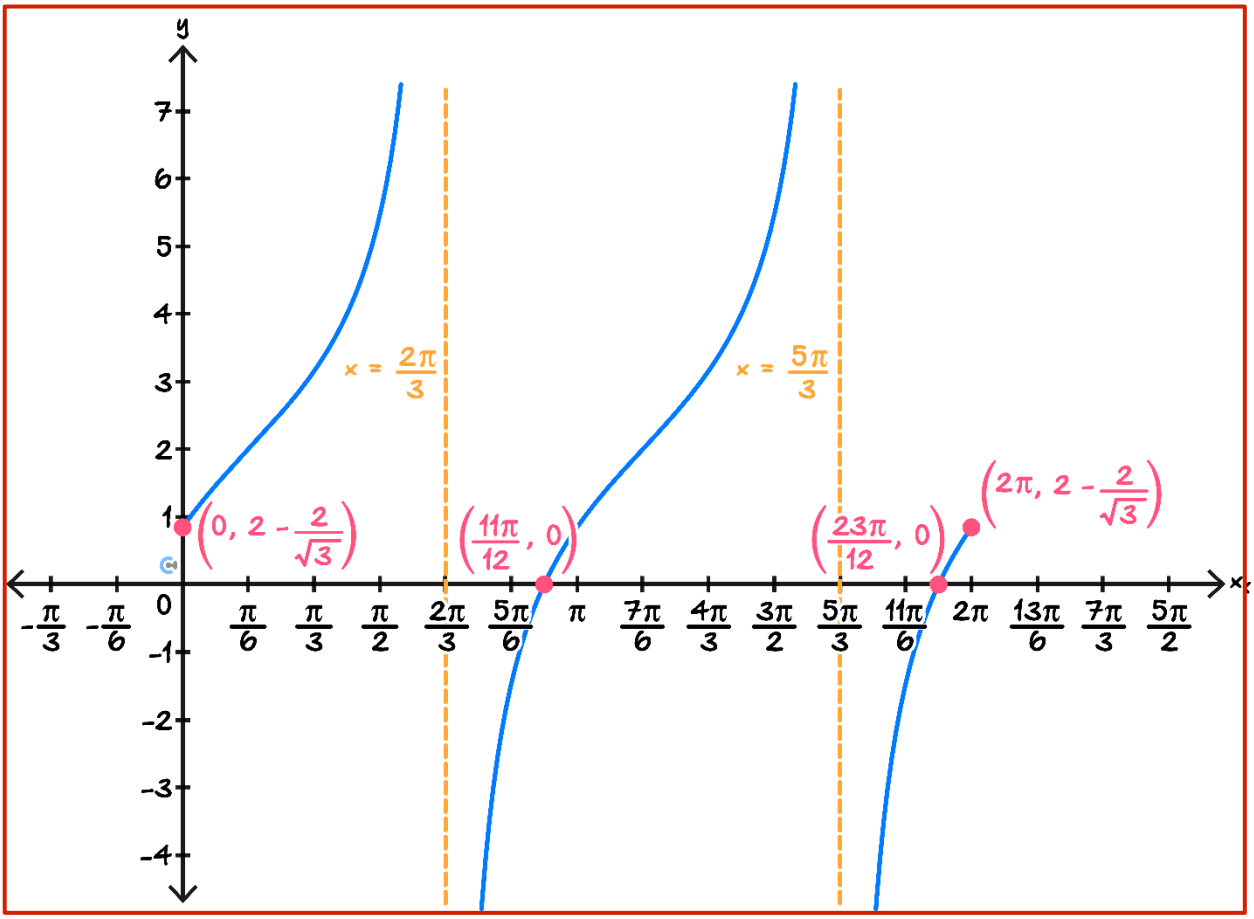
```
Solve[-2 Cos[2 x + π / 6] + 1 == 0 && 0 ≤ x ≤ 2 π, x] // Expand
```

$$\left\{\left\{x \to \frac{\pi}{12}\right\}, \left\{x \to \frac{3\pi}{4}\right\}, \left\{x \to \frac{13\pi}{12}\right\}, \left\{x \to \frac{7\pi}{4}\right\}\right\}$$

Space for Personal Notes

Question 4 (3 marks)

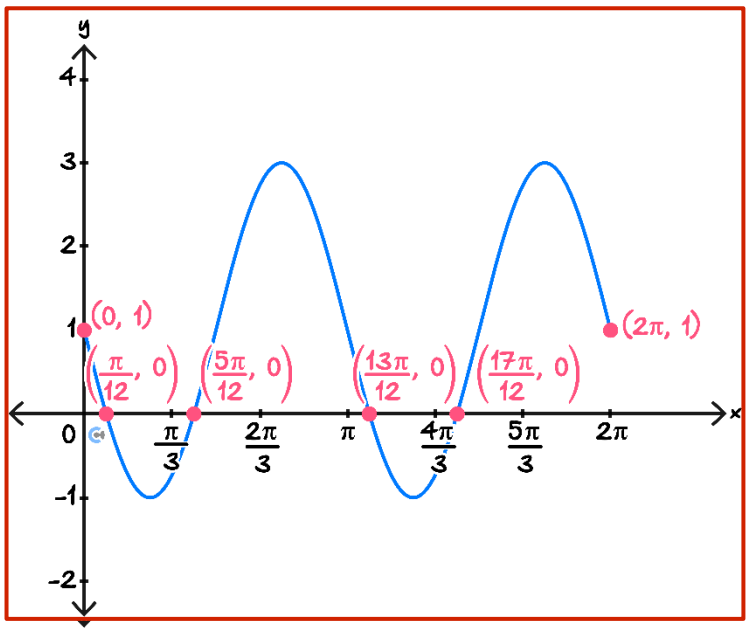
Sketch the graph of $f(x) = 2\tan\left(x - \frac{\pi}{6}\right) + 2$ for $x \in [0, 2\pi]$ on the axes below, labelling all asymptotes, intercepts, and endpoints with their coordinates.



Space for Personal Notes

Question 5 (7 marks)

a. Sketch the graph of $f(x) = 2\cos\left(2x + \frac{\pi}{2}\right) + 1$ for $x \in [0, 2\pi]$ on the axes below, labelling all intercepts and endpoints with their coordinates. (3 marks)



b. Solve $f(x) = 2$ for $x \in [0, 2\pi]$. (3 marks)

```
Solve[2 Cos[2 x + π / 2] + 1 == 2 && 0 ≤ x ≤ 2 π, x]
|풀이 함수   |코사인
```

$$\left\{\left\{x \to \frac{7\pi}{12}\right\}, \left\{x \to \frac{11\pi}{12}\right\}, \left\{x \to \frac{19\pi}{12}\right\}, \left\{x \to \frac{23\pi}{12}\right\}\right\}$$

c. Hence, solve $f(x) \geq 2$ for $x \in [0, 2\pi]$. (1 mark)

```
Reduce[2 Cos[2 x + π / 2] + 1 ≥ 2 && 0 ≤ x ≤ 2 π, x]
|간략   |코사인
```

$$\frac{7\pi}{12} \leq x \leq \frac{11\pi}{12} \;||\; \frac{19\pi}{12} \leq x \leq \frac{23\pi}{12}$$

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