

REG-TRIG-2425-ASM-SET 2-MATH

建議題解

多項選擇題

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|-------|-------|-------|-------|-------|
| 1. C | 2. B | 3. B | 4. D | 5. C |
| 6. A | 7. D | 8. A | 9. B | 10. D |
| 11. C | 12. A | 13. D | 14. A | 15. D |
| 16. D | 17. B | 18. C | 19. A | 20. B |
| 21. D | 22. A | 23. A | 24. D | 25. D |
| 26. B | 27. D | 28. C | 29. C | 30. C |

1. C

$$\begin{aligned}
 & \frac{2 \sin(90^\circ + \theta) - 4 \sin(180^\circ - \theta)}{4 \cos \theta + 2 \sin \theta} \\
 &= \frac{2 \cos \theta - 4 \sin \theta}{4 \cos \theta + 2 \sin \theta} \\
 &= \frac{2 - 4 \tan \theta}{4 + 2 \tan \theta} \\
 &= \frac{2 - 4 \left(-\frac{2}{5}\right)}{4 + 2 \left(-\frac{2}{5}\right)} \\
 &= \frac{9}{8}
 \end{aligned}$$

2. B

$$\begin{aligned}
 \tan(180^\circ - \theta) &= \frac{1}{2} \\
 -\tan \theta &= \frac{1}{2} \\
 \tan \theta &= -\frac{1}{2} \\
 \frac{\sin^2 \theta - \cos^2(180^\circ - \theta)}{\cos^2(180^\circ + \theta)} &= \frac{\sin^2 \theta - \cos^2 \theta}{\cos^2 \theta} \\
 &= \frac{\sin^2 \theta}{\cos^2 \theta} - 1 \\
 &= \left(-\frac{1}{2}\right)^2 - 1 \\
 &= -\frac{3}{4}
 \end{aligned}$$

3. B

$$\begin{aligned}
 & \sin 1^\circ \cos 89^\circ + \sin 2^\circ \cos 88^\circ + \dots + \sin 88^\circ \cos 2^\circ + \sin 89^\circ \cos 1^\circ \\
 &= \sin^2 1^\circ + \sin^2 2^\circ + \dots + \sin^2 88^\circ + \sin^2 89^\circ \\
 &= (\sin^2 1^\circ + \sin^2 89^\circ) + (\sin^2 2^\circ + \sin^2 88^\circ) + \dots + (\sin^2 44^\circ + \sin^2 46^\circ) + \sin^2 45^\circ \\
 &= (\sin^2 1^\circ + \cos^2 1^\circ) + (\sin^2 2^\circ + \cos^2 2^\circ) + \dots + (\sin^2 44^\circ + \cos^2 44^\circ) + \frac{1}{2} \\
 &= 1 \times 44 + \frac{1}{2} \\
 &= 44.5
 \end{aligned}$$

4. D

$$\begin{aligned}
 \tan \frac{A+B}{2} &= \tan \frac{180^\circ - C}{2} \\
 &= \tan \left(90^\circ - \frac{C}{2} \right) \\
 &= \frac{1}{\tan \frac{C}{2}}
 \end{aligned}$$

5. C

I. $\times \circ \sin A = \sin(360^\circ - B) = -\sin B \neq \sin B$

II. $\times \circ$

III. $\checkmark \circ \cos A = \cos(360^\circ - B) = \cos B$

6. A

$$\begin{aligned}
 (\cos \theta - \sin \theta)^2 &= \left(\frac{1}{3} \right)^2 \\
 \cos^2 \theta - 2 \sin \theta \cos \theta + \sin^2 \theta &= \frac{1}{9} \\
 1 - 2 \sin \theta \cos \theta &= \frac{1}{9} \\
 \sin \theta \cos \theta &= \frac{4}{9}
 \end{aligned}$$

7. D

$$\begin{aligned}
 \frac{\cos \theta + 4 \sin \theta}{\cos \theta - \sin \theta} &= \frac{1 + \frac{4 \sin \theta}{\cos \theta}}{1 - \frac{\sin \theta}{\cos \theta}} \\
 &= \frac{1 + 4 \left(\frac{3}{4} \right)}{1 - \frac{3}{4}} \\
 &= 16
 \end{aligned}$$

8. A

$$\begin{aligned} & [\tan(270^\circ + \theta) + \tan(90^\circ + \theta)] \times [\tan(180^\circ + \theta) - \tan(360^\circ - \theta)] \\ &= \left[\frac{-1}{\tan \theta} + \frac{-1}{\tan \theta} \right] \times [(\tan \theta) - (-\tan \theta)] \\ &= \frac{-2}{\tan \theta} \times 2 \tan \theta \\ &= -4 \end{aligned}$$

9. B

$$\begin{aligned} & [\sin(90^\circ + \theta) + 1][\cos(360^\circ - \theta) - 1] \\ &= (\cos \theta + 1)(\cos \theta - 1) \\ &= \cos^2 \theta - 1 \\ &= -\sin^2 \theta \end{aligned}$$

10. D

設 $y = 1$ 及 $x = k$ 。則 $r = \sqrt{1 + k^2}$ 。

$$\begin{aligned} \sin(270^\circ + \theta) &= -\cos \theta \\ &= -\frac{k}{\sqrt{1 + k^2}} \end{aligned}$$

11. C

$$\begin{aligned} \frac{\sin(-\theta)}{\cos 0^\circ} + \frac{\cos(270^\circ - \theta)}{\tan 225^\circ} &= \frac{-\sin \theta}{1} - \frac{\sin \theta}{1} \\ &= -2 \sin \theta \end{aligned}$$

12. A

由於 $\tan \theta < 0$ 及 $\sin \theta > 0$ ， θ 在第二象限。

設 $y = 2$ 及 $x = -1$ 。則 $r = \sqrt{2^2 + 1^2} = \sqrt{5}$ 。

$$\begin{aligned} \sin(\theta - 270^\circ) &= \cos \theta \\ &= \frac{-1}{\sqrt{5}} \end{aligned}$$

13. D

$$\begin{aligned} [1 - \sin(180^\circ - \theta)][1 + \sin(180^\circ + \theta)] &= (1 - \sin \theta)(1 - \sin \theta) \\ &= (1 - \sin \theta)^2 \end{aligned}$$

14. A

設 $y = 1$ 及 $r = k$ 。

則 $x = \sqrt{k^2 - 1^2} = \sqrt{k^2 - 1}$ 。

$$\begin{aligned} \tan(\theta - 90^\circ) &= -\frac{1}{\tan \theta} \\ &= -1 \div \frac{1}{\sqrt{k^2 - 1}} \\ &= -\sqrt{k^2 - 1} \end{aligned}$$

15. D

$$\begin{aligned}
 & \tan 1^\circ \tan 89^\circ + \tan 2^\circ \tan 88^\circ + \dots + \tan 88^\circ \tan 2^\circ + \tan 89^\circ \tan 1^\circ \\
 &= \tan 1^\circ \times \frac{1}{\tan 1^\circ} + \tan 2^\circ \times \frac{1}{\tan 2^\circ} + \dots + \tan 88^\circ \times \frac{1}{\tan 88^\circ} + \tan 89^\circ \times \frac{1}{\tan 89^\circ} \\
 &= 1 \times 89 \\
 &= 89
 \end{aligned}$$

16. D

$$\begin{aligned}
 \frac{\sin(180^\circ - \theta)}{\cos(90^\circ + \theta)} &= \frac{\sin \theta}{-\sin \theta} \\
 &= -1
 \end{aligned}$$

17. B

$$\begin{aligned}
 & \frac{1 + \cos(180^\circ - \theta)}{\cos(90^\circ - \theta)} + \frac{\cos(270^\circ + \theta)}{1 - \sin(90^\circ + \theta)} \\
 &= \frac{1 + (-\cos \theta)}{\sin \theta} + \frac{\sin \theta}{1 - \cos \theta} \\
 &= \frac{(1 - \cos \theta)^2 + \sin^2 \theta}{\sin \theta(1 - \cos \theta)} \\
 &= \frac{1 - 2\cos \theta + \cos^2 \theta + \sin^2 \theta}{\sin \theta(1 - \cos \theta)} \\
 &= \frac{2(1 - \cos \theta)}{\sin \theta(1 - \cos \theta)} \\
 &= \frac{2}{\sin \theta}
 \end{aligned}$$

18. C

$$\begin{aligned}
 & \tan(270^\circ + \theta) = 3 \\
 & -\frac{1}{\tan \theta} = 3 \\
 & \tan \theta = -\frac{1}{3} \\
 & \frac{\sin^3 \theta - \sin \theta \cos^2 \theta + \cos \theta}{\cos \theta} \\
 &= \frac{\sin \theta(\sin^2 \theta - \cos^2 \theta)}{\cos \theta} + 1 \\
 &= \frac{\sin \theta(\sin^2 \theta - \cos^2 \theta)}{\cos \theta} \div \frac{\cos^3 \theta}{\cos^3 \theta} + 1 \\
 &= \frac{\frac{\sin \theta}{\cos \theta} \left(\frac{\sin^2 \theta}{\cos^2 \theta} - 1 \right)}{\frac{1}{\cos^2 \theta}} + 1 \\
 &= \frac{\tan \theta (\tan^2 \theta - 1)}{\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta}} + 1 \\
 &= \frac{\tan \theta (\tan^2 \theta - 1)}{\tan^2 \theta + 1} + 1 \\
 &= \frac{19}{15}
 \end{aligned}$$

19. A

$$\frac{\sin(-\theta) \sin(180^\circ + \theta)}{\cos(270^\circ - \theta) \cos(180^\circ - \theta)} = \frac{-\sin \theta (-\sin \theta)}{(-\sin \theta)(-\cos \theta)}$$

$$= \tan \theta$$

20. B

$$\frac{1}{\sin(180^\circ - \theta)} - \cos(\theta - 90^\circ)$$

$$= \frac{1}{\sin \theta} - \sin \theta$$

$$= \frac{1 - \sin^2 \theta}{\sin \theta}$$

$$= \frac{\cos^2 \theta}{\sin \theta}$$

21. D

$$\sin \theta = \frac{\sqrt{17^2 - 15^2}}{17} = \frac{8}{17}$$

$$\sin(90^\circ + \theta) - \cos(270^\circ - \theta)$$

$$= \cos \theta - (-\sin \theta)$$

$$= \frac{15}{17} + \frac{8}{17}$$

$$= \frac{23}{17}$$

22. A

$$\frac{\sin(90^\circ + \theta)}{\sin(180^\circ - \theta) \tan(270^\circ - \theta)} - \cos^2(180^\circ - \theta)$$

$$= \frac{\cos \theta}{\sin \theta \times \frac{1}{\tan \theta}} - \cos^2 \theta$$

$$= 1 - \cos^2 \theta$$

$$= \sin^2 \theta$$

23. A

$$1 - \frac{\cos(180^\circ - \theta) \sin(180^\circ - \theta)}{\tan(90^\circ + \theta)}$$

$$= 1 - \frac{(-\cos \theta)(\sin \theta)}{-\frac{1}{\tan \theta}}$$

$$= 1 - \frac{\sin \theta \cos \theta}{\frac{\cos \theta}{\sin \theta}}$$

$$= 1 - \sin^2 \theta$$

$$= \cos^2 \theta$$

24. D

$$\begin{aligned}\cos(90^\circ + x) + \cos(360^\circ - x) \\&= -\sin x + \cos x \\&= \cos x - \sin x\end{aligned}$$

25. D

$$\begin{aligned}\frac{\sin(270^\circ - x) \cos(90^\circ - x)}{1 - \sin^2 x} \\&= \frac{-\cos x \sin x}{\cos^2 x} \\&= -\tan x\end{aligned}$$

26. B

由於所有角度皆在 0° 至 180° 之間，可得 $\sin A > 0$ 及 $\cos B < 0$ 。
因此， $\angle B$ 為鈍角。

27. D

$$\begin{aligned}\frac{\tan(\theta - 90^\circ) \sin(360^\circ - \theta)}{\cos(90^\circ + \theta)} \\&= \frac{\frac{-1}{\tan \theta} \times (-\sin \theta)}{-\sin \theta} \\&= -\frac{1}{\tan \theta}\end{aligned}$$

28. C

$$\begin{aligned}\frac{\sin(270^\circ + A) \cos(-A)}{\cos(360^\circ - A)} &= \frac{-\cos A \cos A}{\cos A} \\&= -\cos A\end{aligned}$$

29. C

I. $\checkmark$ $\circ \sin x = \sin(270^\circ - y) = -\cos y$

II. $\checkmark$ $\circ \tan x \tan y = \tan x \tan(270^\circ - x) = \tan x \times \frac{1}{\tan x} = 1$

III. $\times$ $\circ \cos(360^\circ - y) = \cos(360^\circ - (270^\circ - x)) = \cos(90^\circ + x) = -\sin x$

30. C

$$\begin{aligned}\frac{\cos(90^\circ + x) + \sin(180^\circ + x)}{\tan(-x)} &= \frac{-\sin x - \sin x}{-\tan x} \\&= \frac{2 \sin x}{\left(\frac{\sin x}{\cos x}\right)} \\&= 2 \cos x\end{aligned}$$