1. The period of the function

$$f(x) = -3\cos\frac{2x}{3}$$

is

(a) 2π

(b) $\frac{3\pi}{4}$

✔(c) 3π

(d) 4π

(e) $\frac{4\pi}{3}$

2. If $\sec\theta = \frac{2\sqrt{3}}{3}$ and $\sin\theta = -\frac{1}{2}$, then $\cot\theta =$

(a) $\sqrt{3}$

(b) $-\frac{\sqrt{3}}{3}$

(c) $\frac{\sqrt{3}}{2}$

✔(d) $-\sqrt{3}$

(e) $\frac{3}{2}$

3. The reference angle θ' of $\theta = 217°15'$ is

(a) $152°45'$

(b) $46°25'$

(c) $36°45'$

✓(d) $37°15'$

(e) $27°15'$

4. When written as a single logarithm with coefficient 1, the expression

$$\log(x+2) - \log(2x-1) + \log_{\frac{1}{10}}\left(\frac{1}{x-2}\right)$$

becomes

(a) $\log\left(\dfrac{x^2-1}{2x-1}\right)$

(b) $\log\left(\dfrac{2x^2-1}{x-1}\right)$

(c) $\log\left(\dfrac{x+2}{(2x-1)(x-2)}\right)$

✓(d) $\log\left(\dfrac{x^2-4}{2x-1}\right)$

(e) $\log\left[(x^2-4)(2x-1)\right]$

5. The value of $3\tan\frac{\pi}{4}+\sec 60^\circ-\sin 30^\circ\cos\frac{\pi}{3}$ is equal to

✓(a) $\frac{19}{4}$

(b) $-\frac{3}{4}$

(c) $\frac{15}{2}$

(d) $-\frac{1}{2}$

(e) $\frac{3}{4}$

6. $3\log_3 36-6\log_3 2=$

✓(a) 6

(b) 18

(c) 12

(d) 9

(e) 3

7. The period P and the phase shift S of the function

$$f(x) = -2\sec\left(\frac{\pi}{3} - \frac{x}{4}\right) + 5$$

are

(a) $P = 2\pi\,,\ S = \dfrac{2\pi}{3}$

✓ (b) $P = 8\pi,\ S = \dfrac{4\pi}{3}$

(c) $P = 4\pi\,,\ S = \dfrac{\pi}{3}$

(d) $P = 8\pi\,,\ S = -\dfrac{4\pi}{3}$

(e) $P = -8\pi\,,\ S = \dfrac{4\pi}{3}$

8. $\dfrac{\sin x}{1+\cos x} + \cot x =$

(a) $-\cos x$

(b) $\sin x$

✓(c) $\csc x$

(d) $\csc x + \cot x$

(e) $\tan x$

9. If k is an **odd** integer and m is an **even** integer, then $\cos[\theta + 2k\pi] + \sin[\theta + (2m+1)\pi] =$

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

✓ (b) $\cos\theta - \sin\theta$

(c) $\cos\theta + \sin\theta$

(d) $-\cos\theta + \sin\theta$

(e) 0

10. The solution of the equation $\dfrac{4^x - 4^{-x}}{4^x + 4^{-x}} = \dfrac{1}{2}$ is

✓ (a) $\log_4 \sqrt{3}$

(b) $-1 + \log_4 3$

(c) $\sqrt[3]{4}$

(d) $-\ln 4$

(e) $\log_3 4$

11. If a belt runs a drive wheel of radius 8 centimeters at 15 revolutions per minute, then the linear speed of the belt in centimeter per second is

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{16}$

✓ (c) 4π

(d) 16π

(e) $\frac{15}{4}\pi$

12. If A is the solution of the equation

$$2\log\sqrt{4-x} + \log\left(\frac{1}{x+8}\right) = \log(2x+13),$$

then $2A + 1 =$

(a) -15

(b) -19

(c) 10

(d) 5

✓ (e) -9

13. Which one of the following is **TRUE**?

(a) $\sin 2 < \cos 3$

(b) $\sin 2 < \sin 3$

✓ (c) $\sin 2 > \sin 3$

(d) $\cos 3 > \cos 2$

(e) $\cos 2 > \sin 3$

14. A 22 foot ladder is resting against a vertical wall and makes an angle of 60° with ground. Find the exact height to which the ladder will reach the wall

(a) $22\sqrt{3}$ feet

(b) 11 feet

(c) $11\sqrt{2}$ feet

(d) 22 feet

✓ (e) $11\sqrt{3}$ feet

15. Given $\sin\alpha = \frac{\sqrt{2}}{2}$, α in Quadrant I and $\cos\beta = \frac{\sqrt{3}}{2}$, β in Quadrant IV, find $\cos(\alpha - \beta)$

(a) $\frac{\sqrt{3}-\sqrt{2}}{2}$

(b) $\frac{\sqrt{6}+\sqrt{2}}{4}$

✓ (c) $\frac{\sqrt{6}-\sqrt{2}}{4}$

(d) $\sqrt{2}-\sqrt{6}$

(e) $\frac{\sqrt{3}+\sqrt{2}}{2}$

16. If $\frac{\pi}{2} < x < \pi$, then $\tan x =$

(a) $\frac{-\sin x}{1-\sin x}$

✓ (b) $-\frac{\sin x}{\sqrt{1-\sin^2 x}}$

(c) $-\frac{\sin x}{\sqrt{1+\sin^2 x}}$

(d) $\frac{\sin x}{\sqrt{1-\sin^2 x}}$

(e) $\frac{\sin x}{1-\sin^2 x}$

17. The domain of the function $f(x) = \ln\left(\dfrac{x^3}{x-2}\right)$ is

✓ (a) $(-\infty, 0) \cup (2, \infty)$

(b) $(\infty, -2) \cup (2, \infty)$

(c) $(-\infty, 0) \cup (0, \infty)$

(d) $(-2, 0) \cup (0, 2)$

(e) $(-2, 2)$

18. The graph of $y = 2\csc 4x$ has **relative minimum** in the interval $[0, \pi]$ at

(a) $x = \dfrac{\pi}{2}$ and $x = \dfrac{\pi}{4}$

(b) $x = \dfrac{3\pi}{8}$ and $x = \dfrac{7\pi}{8}$

(c) $x = \dfrac{\pi}{4}$ and $x = \dfrac{3\pi}{4}$

✓ (d) $x = \dfrac{\pi}{8}$ and $x = \dfrac{5\pi}{8}$

(e) $x = 0$ and $x = \dfrac{\pi}{4}$

19. If α and β are, respectively, the complement and the supplement of the angle $\theta = 64°15'$, then $2\alpha + \beta$ is equal to

✓ (a) $167°15'$

(b) $154°15'$

(c) $167°45'$

(d) $152°15'$

(e) $25°45'$

20. The range, in interval notation, of the function

$$f(x) = 5 - \left|2\cos\frac{\pi x}{2}\right|$$

is

✓ (a) $[3, 5]$

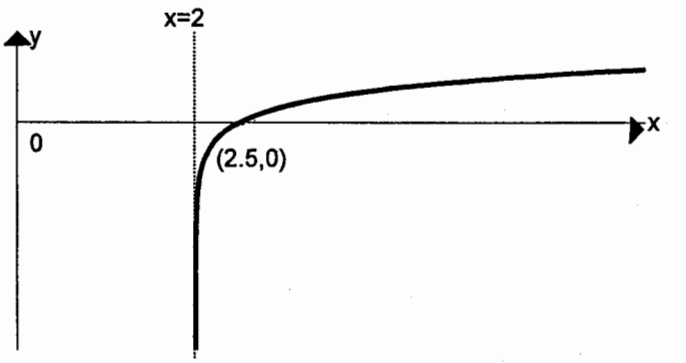
(b) $[-2, 5]$

(c) $[1, 3]$

(d) $[2, 4]$

(e) $[2, 5]$

21. The adjacent figure is the graph of $y = \ln(Ax - B)$, then the value of $5A - 2B$ is



(a) 6

(b) 5

(c) 4

✓ (d) 2

(e) 3

22. If (x, y) are the coordinates of the highest point on the graph of $f(x) = -3\sin\left(\frac{3x}{2}\right) - 1$ in the interval $\left[0, \frac{4\pi}{3}\right]$, then $5x - \pi y =$

(a) 2π

(b) -2π

(c) $-\pi$

✓ (d) 3π

(e) π

23. If $a = (\sqrt{2})^{\log_4 9}$ and $b = 2\sin(\ln e^{\pi/3})$, then $a - b =$

(a) $\sqrt{2}$

(b) 1

(c) $\sqrt{3}$

(d) 2

✓ (e) 0

24. Which one of the following statements is **FALSE** about the graph of the function $f(x) = 2 - \left(\frac{1}{2}\right)^{x+3}$?

(a) The graph increases on the interval $(-\infty, \infty)$.

(b) The graph has x-intercept at $(-4, 0)$.

✓ (c) The graph decreases on the interval $(-\infty, \infty)$.

(d) The graph is below the line $y = 2$.

(e) The graph has $y = 2$ as a horizontal asymptote.

25. Which one of the following statements is **TRUE** about the graph of $y = 3\tan\left(2x + \frac{\pi}{2}\right)$, where $-\frac{5\pi}{4} \leq x \leq \frac{3\pi}{4}$?

(a) The graph is decreasing on $\left(0, \frac{\pi}{2}\right)$.

(b) The graph has three vertical asymptotes.

(c) The graph has one y-intercept.

(d) The graph has five vertical asymptotes.

✓ (e) The graph has 5 x-intercepts.