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

(a) The graph of f decreases on the interval $(-\infty, \infty)$.

(b) The graph of f increases on the interval $(-\infty, \infty)$.

(c) The graph of f decreases on the interval $(-\infty, 2)$ and increases on the interval $(2, \infty)$.

(d) The line $y = 0$ is a horizontal asymptote for the graph of f.

(e) The graph of f lies above the line $y = 1$.

See #37, 38 p. 317

2. Let W be the wrapping function. If $W\left(-\frac{25\pi}{6}\right) = (x, y)$, then $x - y =$

(a) $\frac{1}{2}(\sqrt{3} + 1)$

(b) $-\frac{1}{2}(\sqrt{3} + 1)$

(c) $\frac{1}{2}(-\sqrt{3} + 1)$

(d) $\frac{1}{2}(\sqrt{3} + \sqrt{2})$

(e) $\frac{1}{2}(\sqrt{3} - \sqrt{2})$

See example 2 p. 425, and # 1 to 11 p. 43

3. The adjacent figure represents a part of the graph of

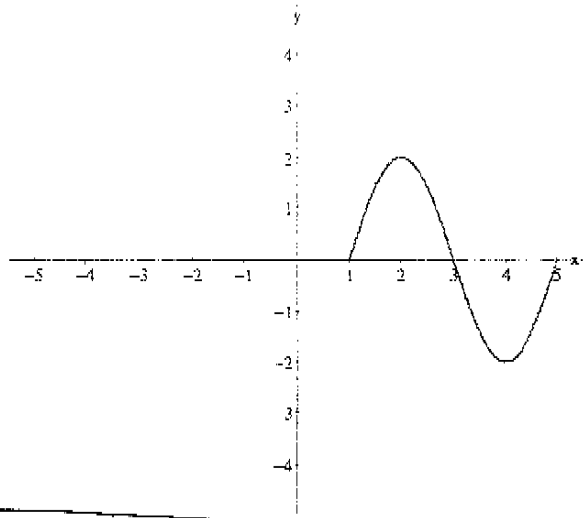
(a) $y = -2\cos\frac{\pi}{2}x$

(b) $y = -2\sin\frac{\pi}{2}x$

(c) $y = 2\cos\frac{\pi}{2}x$

(d) $y = 2\sin\frac{\pi}{2}x$

(e) $y = 2\sin\left(\frac{\pi}{2}x - 1\right)$



See example 5 p.440, Problem #39 p.441 and many others

4. If $f(x) = -3\cos x$ and $g(x) = \sin x + \tan x$, then

(a) $f(x)$ is an even function and $g(x)$ is an odd function

(b) both $f(x)$ and $g(x)$ are even functions

(c) $f(x)$ is an odd function and $g(x)$ is an even function

(d) $f(x)$ is an even function and $g(x)$ is neither an odd nor an even function

(e) both $f(x)$ and $g(x)$ are odd functions

See example 3 p.427 and # 33 to 40 p.432

5. The exact value of $\log_{0.3} \dfrac{1000}{27}$ is equal to

(a) 3

(b) $\dfrac{1}{3}$

(c) $\dfrac{1}{9}$

(d) 0.9

(e) -0.9

Similar to #25 to 28 p. 327

6. The period P, amplitude A, and phase shift S of the graph of $y = -8\sin\left(\dfrac{3\pi}{2}x - \dfrac{\pi}{2}\right)$ are:

(a) $P = \dfrac{4}{3}$, $A = 8$, $S = \dfrac{1}{3}$

(b) $P = 2\pi$, $A = 8$, $S = -\dfrac{1}{3}$

(c) $P = \dfrac{4}{3}$, $A = -8$, $S = \dfrac{1}{3}$

(d) $P = \dfrac{1}{3}$, $A = 8$, $S = \dfrac{\pi}{3}$

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

See example 6 p. 453, problems #39 to 44 p. 456

7. Given $\tan\alpha = -\frac{4}{3}$ where α terminates in quadrant II and $\cos\beta = \frac{12}{13}$ where β terminates in quadrant IV, then $\csc(\alpha+\beta) =$

(a) $\frac{65}{63}$

(b) $\frac{65}{33}$

(c) $-\frac{63}{65}$

(d) $-\frac{65}{33}$

(e) $-\frac{65}{63}$

Similar to example 2 p. 482 and Problems 31 to 42 p. 485

8. The adjacent figure represents the graph of

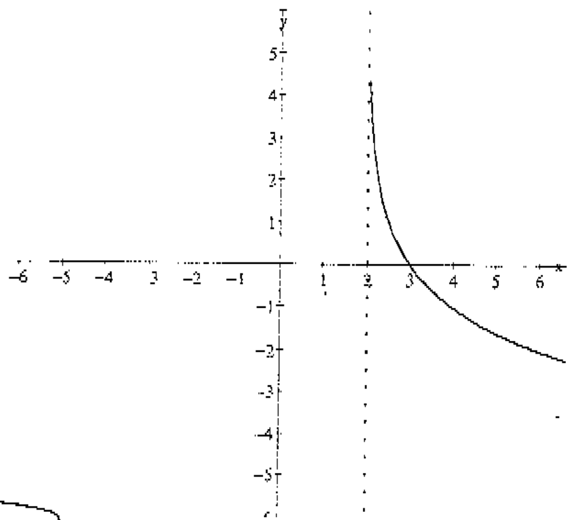
(a) $y = \log_{\frac{1}{2}}(x-2)$

(b) $y = 2 - \log_2 x$

(c) $y = \log_{\frac{1}{3}}(x-3)$

(d) $y = \log_2(x-2)$

(e) $y = \log_{\frac{1}{2}} x - 2$



Similar to example 7 p. 325

and # 51, 52 p. 328

9. If a wheel rotates at 750 revolutions per minute, then the angular speed of the wheel in radians per second is equal to

(a) 25π

(b) 1500π

(c) 750

(d) 750π

(e) $\dfrac{375}{\pi}$

See example 7 p. 397 and #69, 70

10. The arc length that subtends a central angle $50°$ in a circle of diameter 10 cm is equal to

(a) $\dfrac{25\pi}{18}$ cm

(b) 250 cm

(c) 500 cm

(d) $\dfrac{9\pi}{25}$ cm

(e) 5 cm

See example 5 p. 396 and #59 to 62 p. 399

11. The x- and y-intercepts of the graph of $f(x) = 2^{x+1} - 4$ are

(a) $(1, 0)$ and $(0, -2)$
(b) $(2, 0)$ and $(0, 1)$
(c) $(0, 0)$ and $(0, -2)$
(d) $(1, 0)$ and $(0, -1)$
(e) $(-1, 0)$ and $(0, 2)$

12. The smallest positive angle coterminal with the angle $\theta = -870°$ is equal to

(a) $210°$
(b) $150°$
(c) $30°$
(d) $-150°$
(e) $-210°$

See example 2 p. 391 and #13 to 18 p. 399

13. The value of $\csc\frac{5\pi}{3} + \tan\pi + \cot\frac{7\pi}{6}$ is

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

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

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

(d) $-\frac{4\sqrt{3}}{3}$

(e) $\frac{5\sqrt{3}}{3}$

See example 4 p-430 and # 37 to 48 p-432

14. The range of the function

$$y = \frac{1}{3}\csc(2x+9) - 7$$

is

(a) $\left(-\infty, -\frac{22}{3}\right] \cup \left[-\frac{20}{3}, \infty\right)$

(b) $\left(-\infty, -\frac{1}{3}\right] \cup \left[\frac{1}{3}, \infty\right)$

(c) $\left[-\frac{22}{3}, -\frac{20}{3}\right]$

(d) $\left(-\infty, -\frac{7}{3}\right] \cup \left[\frac{7}{3}, \infty\right)$

(e) $\left(-\infty, -\frac{20}{3}\right] \cup \left[\frac{22}{3}, \infty\right)$

See example 6 p-453, Problems 47 to 49 p-456

15. If the terminal side of an angle θ passes through the point $(-12, 5)$, then $\cot\theta + \csc\theta$ is equal to

(a) $-\frac{1}{5}$

(b) $-\frac{4}{5}$

(c) $\frac{4}{5}$

(d) $\frac{3}{5}$

(e) $-\frac{3}{5}$

See example 1 p. 416 and # 1 to 6 p. 421

16. The solution set of the equation

$$\log_3(-x) + \log_3(6 - x) = 3$$

contains

(a) one negative integer only

(b) two negative integers

(c) one positive integer and one negative integer

(d) one positive integer only

(e) no real numbers

See examples 6, 7 p. 346 and # 25 to 30 p. 349

17. Which one of the following statements is TRUE for the graph of $y = \left|3\sec\frac{2x}{3}\right|$ on the interval $\left[0, \frac{3\pi}{2}\right]$?

(a) The graph is symmetric about the line $x = \frac{3\pi}{4}$.

(b) The graph is decreasing on $\left(0, \frac{3\pi}{4}\right)$.

(c) The graph is increasing on $\left(\frac{3\pi}{4}, \frac{3\pi}{2}\right)$.

(d) The graph has no y-intercepts.

(e) The graph has only one x-intercept.

18. The number of the vertical asymptotes for the graph of $y = 8\tan\frac{x}{5}$ on the interval $[0, 10\pi]$ is equal to

(a) 2

(b) 1

(c) 0

(d) 3

(e) 4

See example 2 p-444 and the problems on tangents from 21 to 40 p-448

19. The expression $\dfrac{1+\sin\theta}{1-\sin\theta}$ is identical to

(a) $(\sec\theta + \tan\theta)^2$
(b) $(\csc\theta + \cot\theta)^2$
(c) $(\sec\theta + \sin\theta)^2$
(d) $(\cos\theta + \tan\theta)^2$
(e) $(\sec\theta + \csc\theta)^2$

See example 4 p. 474 and problem #57 p. 476

20. The sum of all solutions of the equation

$$e^x + 6e^{-x} = 5$$

is equal to

(a) $\ln 6$
(b) 1
(c) $\ln 5$
(d) $\ln\dfrac{3}{2}$
(e) $\ln\dfrac{2}{3}$

See example 4 p. 345 and # 39 to 46 p. 349

21. The product $\cos 22° \cdot \cot 68° \cdot \csc(-22°)$ simplifies to

(a) -1
(b) $\cos^2 22°$
(c) $\sin^2 22°$
(d) 1
(e) $-\cos^2 22°$

A direct application of the Cofunction identities

22. An observer notes that the angle of elevation from point A to the top of a tower is $45°$. From a point 10 m further from point A, the angle of elevation is $30°$. Then the height of the tower is equal to

(a) $5\sqrt{3}+5$ m
(b) 5 m
(c) 10 m
(d) $10\sqrt{3}$ m
(e) $5\sqrt{3}$ m

See example 6 p. 469 and #72 p. 413

23. The expression $(\log_3 x)(\ln 9) - \dfrac{2\log_3 y}{\log_3 e}$ simplifies to

(a) $\ln\left(\dfrac{x^2}{y^2}\right)$

(b) $\ln(x^2 - y^2)$

(c) $\ln(x^2y^2)$

(d) $\ln(27xy)$

(e) $\ln\left(\dfrac{3x}{y^2}\right)$

A direct application of change of base formula and the properties of Logarithmic functions

24. $\dfrac{\tan\frac{31\pi}{12} + \tan\left(-\frac{\pi}{4}\right)}{1 + \tan\frac{7\pi}{12}\tan\frac{\pi}{4}} =$

(a) $\tan\dfrac{\pi}{3}$

(b) $\tan\dfrac{\pi}{6}$

(c) $-\tan\dfrac{\pi}{3}$

(d) $-\tan\dfrac{\pi}{6}$

(e) $\tan\dfrac{5\pi}{12}$

See problem 17, 18 p. 484

25. Which one of the following statements is TRUE?

(a) The graphs of $y = \cos x$ and $y = \cos|x|$ are the same.

(b) The function $y = \sec x$ has infinite number of zeros.

(c) The phase shift of $y = \tan\left(3x - \frac{\pi}{6}\right)$ is $\frac{\pi}{6}$.

(d) The maximum value of $y = -3\sin(2x+1)$ is -3.

(e) The minimum value of $y = 9\csc\frac{2\pi x}{5}$ is -9.