MATH 1720 – Precalculus – Final Exam, Fall, 2002

1. (Not on the final for spring)

2. The domain of the function $f(x) = \sqrt{2 - x}$ is the set of numbers x satisfying:
(A) $x \le 2$ (B) $x \ne 2$ (C) $x \ge 2$ (D) all real numbers

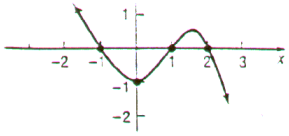
3. Consider the functions $f(x) = x^3 + x^2$ and $g(x) = x^2 + 1$. Then
(A) f and g are both even (B) f is odd and g is even
(C) f is neither even nor odd and g is even (D) f and g are neither even nor odd

4. Write the expression for the function whose graph is the graph of $y = x^3$ but shifted down 4 units and left 5 units.
(A) $y = (x - 5)^3 - 4$ (B) $y = (x + 5)^3 - 4$ (C) $y = (x - 5)^3 + 4$ (D) $y = (x - 4)^3 - 5$

5. Given $f(x) = 2x + 3$ and $g(x) = \sqrt{x}$, find $(f \circ g)(x)$.
(A) $(f \circ g)(x) = \sqrt{2x + 3}$ (B) $(f \circ g)(x) = (2x + 3)\sqrt{x}$
(C) $(f \circ g)(x) = 2\sqrt{x} + 3$ (D) $(f \circ g)(x) = 2\sqrt{x + 3}$

6. Find the vertex V and the x-intercepts x_1 and x_2 of the quadratic function $f(x) = 2x^2 - 8x$.
(A) V(2, -8); $x_1 = 0$, $x_2 = 4$ (B) V(2, -4); $x_1 = 0$, $x_2 = 4$
(C) V(0, 0); $x_1 = -2$, $x_2 = 4$ (D) V(0,0); $x_1 = 2$, $x_2 = -8$

7. Which of the following functions might have the graph pictured here?

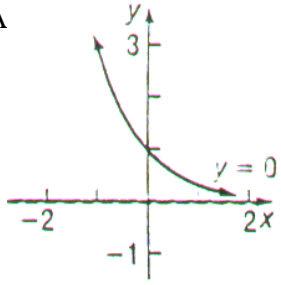


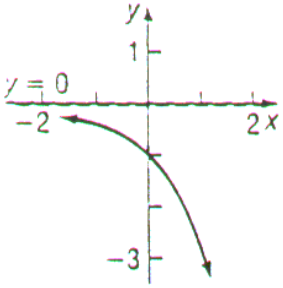
(A) $y = \frac{1}{2}(x^2 - 1)(x - 2)$ (B) $y = \frac{1}{2}(x^2 + 1)(x - 2)$
(C) $y = (x^2 - 1)\left(1 - \frac{x}{2}\right)$ (D) $y = -(x - 1)(x - 2)$

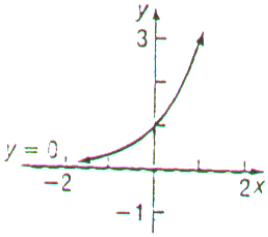
8. Find the vertical and horizontal asymptotes of the function $f(x) = \frac{2x}{x - 5}$.
(A) Vertical: $x = 5$; Horizontal: $y = 0$ (B) Vertical: $x = 2$; Horizontal: $y = 1$
(C) Vertical: $x = 2$; Horizontal: $y = 5$ (D) Vertical: $x = 5$; Horizontal: $y = 2$

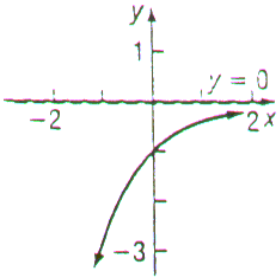
9. Find the inverse of the function $f(x) = \frac{1}{x - 2}$.
(A) $f^{-1}(x) = x - 2$ (B) $f^{-1}(x) = \frac{1}{x} + 2$ (C) $f^{-1}(x) = \frac{1}{x + 2}$ (D) $f^{-1}(x) = x + 2$

10. Which of the following is the graph of the function $f(x) = -3^{-x}$?

A 

B 

C 

D 

11. Give the domain D, range R, and the x-intercept X of the function $y = \ln x$.
(A) $D = \{x \mid x > 0\}$; R = all real numbers; $X = 1$
(B) D = all real numbers; $R = \{y \mid y > 0\}$; $X = 1$
(C) $D = \{x \mid x > 0\}$; $R = \{y \mid y > 0\}$; $X = 1$
(D) D = all real number; R = all real numbers; $X = 0$

12. Solve the equation: $\log_4 x + \log_4 (x - 3) = 1$.
(A) $x = 4$ or $x = 1$ (B) $x = 3.5$ (C) $x = 4$ (D) no solution

13. Iodine 131 is a radioactive material that decays according to the function $A(t) = A_0 e^{-0.087t}$, where A_0 is the initial amount present and A is the amount present at time t (in years). Determine how long it takes for 250 grams of iodine 131 to decay to 50 grams.
(A) 19 years (B) 5 years (C) 50 years (D) 10 years

14. Find the length of the arc of a circle with radius 10 cm subtended by a central angle of 45°.
(A) 450 cm (B) $\frac{40}{\pi}$ cm (C) $\frac{\pi}{40}$ cm (D) $\frac{5\pi}{2}$ cm

15. Find $\sin\frac{\pi}{6}$ and $\tan\frac{\pi}{3}$: (A) $\frac{1}{2}, \sqrt{3}$ (B) $\frac{\sqrt{3}}{2}, \sqrt{3}$ (C) $\frac{1}{2}, \frac{\sqrt{3}}{3}$ (D) $\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{3}$

16. Suppose that $\cos\theta = 3/5$ and θ lies in Quadrant IV. Find $\sin\theta$ and $\tan\theta$.
(A) $\sin\theta = 4/5$, $\tan\theta = -4/3$ (B) $\sin\theta = -4/5$, $\tan\theta = -4/3$
(C) $\sin\theta = 4/5$, $\tan\theta = 4/3$ (C) $\sin\theta = -4/5$, $\tan\theta = 4/3$

17. Determine the equation of the sine function which has amplitude 2 and period 4.
(A) $y = 2\sin(4x)$ (B) $y = 2\sin\left(\frac{\pi}{2}x\right)$ (C) $y = 4\sin(2x)$ (D) $y = 4\sin\left(\frac{\pi}{4}x\right)$

18. For what values of x between 0 and 2π does $y = \sec x$ have vertical asymptotes?
(A) $\frac{\pi}{2}, \frac{3\pi}{2}$ (B) $\frac{\pi}{4}, \frac{3\pi}{4}$ (C) $0, \pi, 2\pi$ (D) There are no vertical asymptotes.

19. Find the exact value of $\tan^{-1}(-1)$ and $\cos^{-1}(-1)$.

(A) $\frac{3\pi}{4}, \pi$ (B) $\frac{\pi}{4}, 0$ (C) $\frac{3\pi}{4}, \frac{3\pi}{2}$ (D) $\frac{-\pi}{4}, \pi$

20. Which of the following equals $1 - \frac{\sin^2\theta}{1 - \cos\theta}$?

(A) $\cos\theta$ (B) $-\cos\theta$ (C) $1 - \sin\theta$ (D) $1 + \sin\theta$

21. If $\sin\theta = \frac{1}{3}$ and θ lies in Quadrant II, find the exact value of $\sin\left(\theta + \frac{\pi}{6}\right)$.

(A) $\frac{5}{6}$ (B) $\frac{\sqrt{3} + \sqrt{8}}{6}$ (C) $\frac{\sqrt{3} - \sqrt{8}}{6}$ (D) $\frac{\sqrt{3} - 1}{2}$

22. If $\cos\theta = \frac{-3}{5}$ and $\pi < \theta < \frac{3\pi}{2}$, then find $\cos\left(\frac{\theta}{2}\right)$.

(A) $\frac{-3}{10}$ (B) $\frac{\sqrt{5}}{5}$ (C) $\frac{-2\sqrt{5}}{5}$ (D) $\frac{-\sqrt{5}}{5}$

23. What are the first four positive solutions of the equation $\sin(2\theta) = \frac{1}{2}$?

(A) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$ (B) $\frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$

(C) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{7\pi}{3}, \frac{8\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

24. Find all solutions in the interval $[0, 2\pi]$ for the equation $2\cos^2\theta - 1 = 0$.

(A) $\frac{\pi}{4}, \frac{7\pi}{4}$ (B) $\frac{3\pi}{4}, \frac{5\pi}{4}$ (C) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ (D) $\frac{\pi}{3}, \frac{5\pi}{3}$

25. A ship, off-shore from a vertical cliff known to be 200 feet high, takes a sighting of the top of a cliff. If the angle of elevation is found to be 15 degrees, approximately how far off-shore is the ship?

(A) 3000 feet (B) 1500 feet (C) 500 feet (D) 750 feet

Answers

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