

MATH 141 Final
FALL 2004

Name: _____

1.

Find the domain of the function $f(x) = \sqrt{1-3x}$

- a) $(-\infty, 1/3)$
- b) $(-\infty, -1/3)$
- c) $(1/3, \infty)$
- d) $(-1/3, \infty)$

2.

Determine whether the function is even, odd, or neither: $f(x) = 3x^2 - 2x$

- a) even
- b) odd
- c) neither

3.

Find the range of the quadratic function $f(x) = 3x^2 - 2x + 1$

- a) $(1/3, \infty)$
- b) $(-\infty, 2/3)$
- c) $(-\infty, 1/3)$
- d) $(2/3, \infty)$

4.

Find $f(3/2)$ given the function $f(x) = -3|x^2 - 3|$

a) $-\frac{9}{4}$

b) $-\frac{9}{2}$

c) $\frac{9}{4}$

d) $\frac{9}{2}$

5.

The height in feet of a football thrown upward is given by the function $h(t) = 20t - 2t^2$. Find the maximum height attained by the football.

a) $\frac{1}{40}$

b) 50

c) 5

d) 90

6.

$f(x) = \sqrt{5 + 2x}$. Find the inverse function if it exists.

a) $f^{-1}(x) = \frac{x^2 - 5}{2}$

b) $f^{-1}(x) = (5 + 2x)^2$

c) $f^{-1}(x) = -(5 + 2x)^2$

d) Does not exist

7.

$$f(x) = \frac{x}{x-3}, \quad g(x) = 3x+4. \text{ Find } g \circ f \text{ and simplify.}$$

a) $\frac{3x+4}{3x+1}$

b) $\frac{3x+4}{3x-7}$

c) $\frac{7x-12}{x-3}$

d) $\frac{7x+12}{x-3}$

8.

Suppose that we have the polynomial $f(x) = x^3 - 6x^2 + 11x - 6$, then which of the following is not a root of $f(x)$.

a. $x = 3$

b. $x = 2$

c. $x = 4$

d. $x = 1$

9.

By the Polynomial Remainder Theorem or Synthetic Division what is the remainder of $\frac{5x^3 - 3x + 2}{x - 2}$.

a. $R = 36$

b. $R = 42$

c. $R = 46$

d. $R = 30$

10. Which values are not possible rational zeros of $f(x) = 3x^2 + ax + 4$, where a is an integer?

- a. ± 1
- b. ± 3
- c. ± 4
- d. ± 2

11.

Which of the following is equivalent to $(2 + i)(3 - i)$

- a. $7 - i$
- b. $6 - 2i$
- c. $7 + i$
- d. $6 + 2i$

12.

Which of the following is equivalent to $(6 + i) + (-7) + i$.

- a. $-1 + 2i$
- b. $-1 - i$
- c. $-2i$
- d. $i - 2$

13.

Which of the following is equivalent to $\frac{1+i}{2-i}$.

- a. $\frac{1+3i}{5}$
- b. $\frac{3+i}{5}$
- c. $3+i$
- d. $1+3i$

14.

If $f(x)$ is a polynomial with real coefficients and $x = 2 - i$ is a root of $f(x)$, then so is

- a. $-2 - i$
- b. 0
- c. $2 + i$
- d. it is not a root

15.

What are the vertical and horizontal asymptotes of $\frac{15x^2 - x + 2}{5x^2 - x + 1}$.

- a. Vertical $x = \frac{1 \pm \sqrt{5}}{2}$ Horizontal $y = 3$
- b. Vertical $x = dne$ Horizontal $y = dne$
- c. Vertical $x = dne$ Horizontal $y = 3$
- d. Vertical $x = 0$ Horizontal $y = dne$

16. The longest side of a 30-60-90 triangle is 6 inches. How long is the shortest side?

- a. 3 inches
- b. $3\sqrt{2}$ inches
- c. $2\sqrt{3}$ inches
- d. 2 inches

17. Evaluate $\cos(\pi/3)\sin(\pi/6)$

- a. $\frac{1}{2}$
- b. $\frac{1}{4}$
- c. $(\sqrt{3})/2$
- d. 1

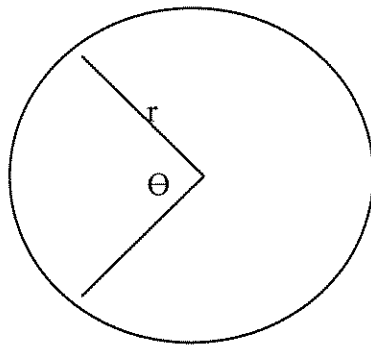
18. Which of the following is defined?

- a. $\sec(\pi/2)$
- b. $\csc(\pi/2)$
- c. $\tan(\pi)$
- d. $\cot(\pi)$
- e. b and c

19. What is the point on the unit circle corresponding to $\Theta = \frac{27\pi}{4}$

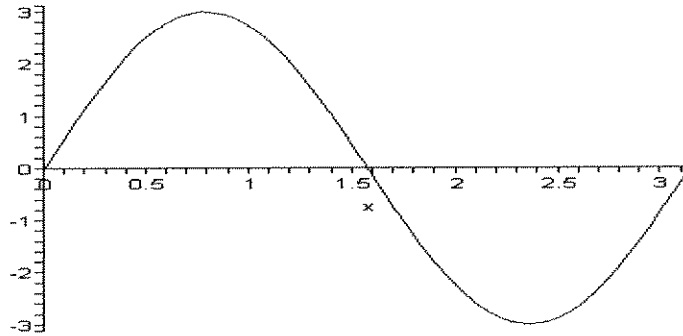
- a. $(\frac{\sqrt{3}}{2}, \frac{1}{2})$
- b. $(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
- c. $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
- d. $(0, -1)$

20. Find the area of the shaded sector of the circle of radius 2 and angle $\Theta = \pi/3$



- a. $\frac{2\pi}{3}$
- b. $\frac{\pi}{6}$
- c. 2
- d. $\frac{4\pi}{5}$

21. What trigonometric function corresponds to the given graph?



- a. $f(x) = 3\cos x$ c. $f(x) = 3\cos(2x)$
 b. $f(x) = 3\sin x$ d. $f(x) = 3\sin(2x)$

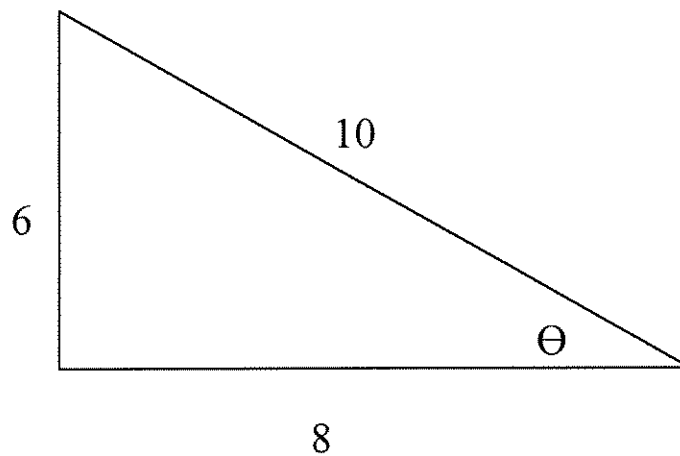
22. What is the minimum value on the graph of $f(\theta) = 7\cos 3(\theta - \pi) + 2$?

- a. -3
 b. -4
 c. -5
 d. -6

23. If $\csc \theta = 2$ and the terminal point of θ is in quadrant II, what is the value of $\cos \theta$?

- a. $\frac{1}{2}$ b. $-\frac{1}{2}$ c. $\frac{\sqrt{3}}{2}$ d. $-\frac{\sqrt{3}}{2}$

24. Given the triangle below, find $(\cot \theta)(\csc \theta)$



- a. $2/7$ b. $20/9$ c. $1/4$ d. $2/3$

25. Simplify the expression $10^{(2+\log 5)}$.

- a. $100^{\log 5}$ b. 500 c. $20+10\log 5$ d. 250 e. 105

26. Evaluate the expression $\log_2 5 - \log_2 160$.

- a. -4 b. -5 c. -6 d. -7 e. -8

27. Solve the following logarithmic equation for x . $\log_2(x+1) + \log_2 3 = 4$

- a. $\frac{8}{3}$ b. $2^{12} - 4$ c. $2^{12} - 4\log_2 6$ d. $\frac{13}{3}$ e. $2^{(3-\log_2 3)}$

28. Solve the following exponential equation for x . $4e^{3x-1} = 24$

- a. $\frac{1}{3}(1 + \ln 6)$ b. $\frac{1}{3}(1 + \frac{\ln 24}{\ln 12})$ c. $\frac{1}{12}(\ln 25)$ d. $\frac{1}{3}\ln(1 + \ln 20)$ e. $\frac{\ln 8}{12}$

29. Solve the following logarithmic equation for x . $\frac{\ln(4x+10)}{\ln 2} = 3$.

- a. $\frac{1}{2}(e^3 - 5)$ b. -1 c. $\frac{3}{4}\ln 2 - \frac{5}{2}$ d. $-\frac{1}{2}$ e. $-\frac{3}{4}$

30. What is the domain of the function $f(x) = \ln(4 - x^2)$?

- a. $x = \pm 2$ b. $x \leq -2$ c. $-2 < x < 2$ d. $-2 \leq x \leq 2$ e. $x < -2$