

MATH 150 FINAL REVIEW (version1)

Solve the following equations for x:

1. $7x^2 = 6x - 3$

a. $\frac{3 \pm 2\sqrt{3}}{7}$ b. $\frac{3 \pm i 2\sqrt{3}}{7}$ c. $\frac{3 \pm \sqrt{30}}{7}$ d. $\frac{-3 \pm i 4\sqrt{3}}{7}$

2. $\sqrt{4 + 6x} = 2x$

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

3. $9x^4 + 6x^2 - 3 = 0$

a. $\pm \frac{\sqrt{3}}{3}, \pm 1$ b. $\pm \frac{1}{3}, \pm i$
c. $\pm \frac{\sqrt{3}}{3}, \pm i$ d. $\pm \frac{1}{3}, \pm 1$

4. $|6x - 3| = 9$

a. 2 b. -1, 2 c. 1, -2 d. 1, -1

5. $2x^2 - 11x < 21$

a. $(-\infty, -\frac{3}{2}) \cup (7, \infty)$ b. $[-\frac{3}{2}, 7]$
c. $(-7, \frac{3}{2})$ d. $(-\frac{3}{2}, 7)$

Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the given function f(x).

6. $f(x) = x^2 + 2x$

a. $2x + h - 2$ b. $h + 2$
c. $2xh + h^2 + 2h$ d. $2x + h + 2$

Find the domain of the following functions:

7. $f(x) = \sqrt{4 - 2x}$

a. $(-\infty, 2]$

b. $(-\infty, \infty)$

c. $(-\infty, 2)$

d. $[2, \infty]$

8. $f(x) = \frac{4-x}{x^2-6x+8}$

a. $(-\infty, 2) \cup (4, \infty)$

b. $(2, 4)$

c. $(-\infty, 2) \cup (2, 4) \cup (4, \infty)$

d. $(-\infty, \infty)$

9. $f(x) = \frac{6x}{\sqrt{3-4x}}$

a. $(-\infty, \frac{3}{4}]$

b. $(\frac{3}{4}, \infty)$

c. $(-\infty, \frac{3}{4})$

d. $[\frac{3}{4}, \infty)$

10. $f(x) = 1 + \log|x + 1|$

a. $(1, \infty)$

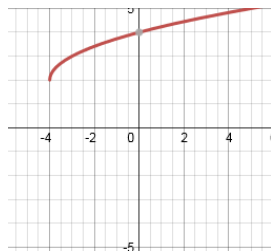
b. $(-1, \infty)$

c. $(-\infty, \infty)$

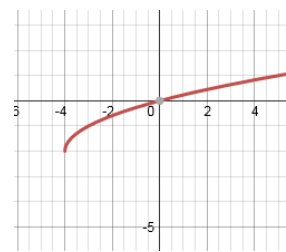
d. $(0, \infty)$

Match the functions or equations to their graphs:

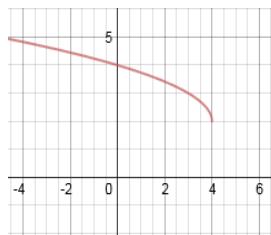
11. $f(x) = \sqrt{x - 4} + 2$



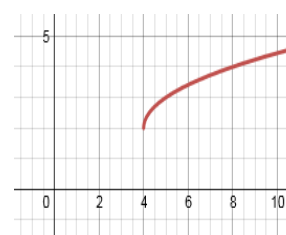
a.



b.

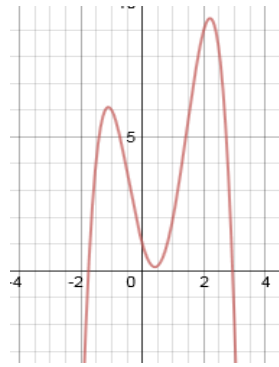


c.

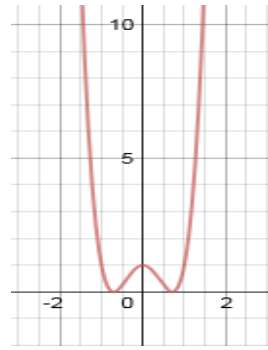


d.

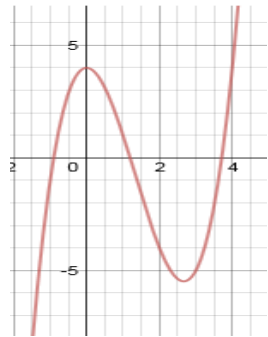
12. $f(x) = -x^4 + 2x^3 + 4x^2 - 4x + 1$



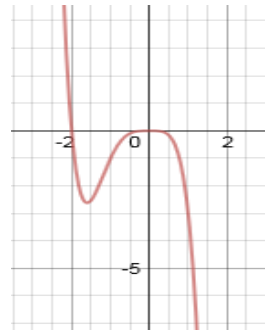
a.



b.



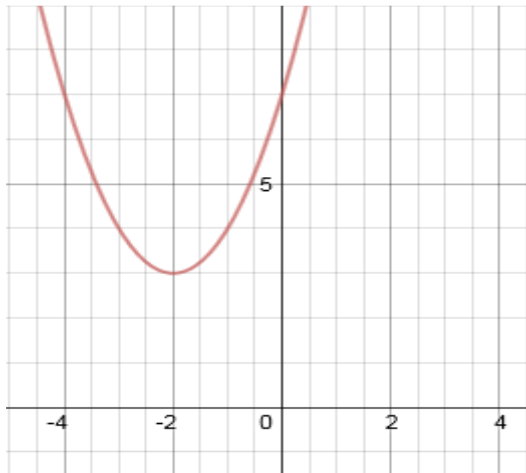
c.



d.

Find the Equation for the following graphs:

13.



a. $y = (x + 2)^2 + 3$

b. $y = (x - 2)^2 + 3$

c. $y = -(x + 2)^2 + 3$

d. $y = (x + 2)^2 - 3$

18. What are the vertical and horizontal asymptotes of the graph of $f(x) = \frac{4-x}{x^2-4}$

a. Vertical: $x = 2, x = -2$
Horizontal: $y = 0$

b. Vertical: $x = 2$
Horizontal: $y = 0$

c. Vertical: $x = 2, x = -2$
Horizontal: $y = -1$

d. Vertical: $x = 2, x = -2$
Horizontal: $y = 1$

19. For $f(x) = \frac{3}{4-x}$, $x \neq 4$, find $f^{-1}(x)$

a. $f^{-1}(x) = 3 - \frac{4}{x}$

b. $f^{-1}(x) = 4x - 3$

c. $f^{-1}(x) = \frac{3}{4} - x$

d. $f^{-1}(x) = 4 - \frac{3}{x}$

20. The length of your forearm (F) is directly proportional to the length of your hand (H). If the length of your forearm is 11 inches and the length of your hand is 6.8 inches, find the constant of variation and write the variation equation.

a. $F = 1.618 H$

b. $H = 1.618 F$

c. $F = 0.618 H$

d. $F = \frac{1.618}{H}$

Re-write the following logarithmic expressions by simplifying, combining, or expanding:

21. Find $\log_3 27$

a. -3

b. 2

c. 3

d. $\frac{1}{3}$

22. Expand $\log \frac{\sqrt{x}}{y^3 z^4}$

a. $\frac{1}{2} \log x - 4 \log y - 3 \log z$

b. $\frac{1}{2} \log x - 3 \log y + 4 \log z$

c. $\frac{1}{2} \log x - 3 \log y - 4 \log z$

d. $\log x - 3 \log y - 4 \log z$

23. **Combine** $2 \log x + 3 \log y - \frac{1}{2} \log z$

a. $\log(x^2 y^3 z^2)$

b. $\log\left(\frac{x^2 y^3}{z^2}\right)$

c. $2 \log\left(\frac{x y^3}{z}\right)$

d. $\log\left(\frac{x^2 y^3}{\sqrt{z}}\right)$

Solve the following exponential and logarithmic equations for x:

24. $\ln(2x + 2) + \ln(x - 4) = \ln(9x)$

a. $8, -\frac{1}{2}$

b. 8

c. $\frac{1}{2}$

d. $\frac{1}{2}, -8$

25. $\log_2(x - 1) + \log_2(x - 3) = 3$

a. 5

b. $5, -1$

c. $-5, 1$

d. No Solution

26. $9^x = 27^{x-4}$

a. 1

b. $\frac{12}{5}$

c. No Solution

d. 12

27. $20 - 4e^{6x} = 8$

a. $\frac{\ln 3}{6}$

b. $-\frac{\ln 3}{6}$

c. $\frac{e^3}{6}$

d. $6 \ln 3$

Solve the following exponential and logarithmic applications:

28. A colony of bacteria is growing exponentially. The number of bacteria N is given by the model $N = N_0 e^{rt}$ where $r = 20\%$ per hour. If 500 bacteria are initially in the colony, how many bacteria are in the colony after 1 day?

a. $60,756$

b. 2400

c. 611

d. $5,512$

29. How much money should you deposit into an account that pays 6% a year compounded continuously to have \$80,000 in the account after 18 years?

a. $\$38,462$

b. $\$27,168$

c. $\$235,574$

d. $\$7,407$

30. Find the point(s) of intersection for the following system of equations: $x^2 + y = 2$
 $2x + y = -1$

- a. $(-1, 3)$ b. $(-1, -7)$ c. $(-1, 1)$ d. $(1, 1)$
 $(3, 7)$ $(3, 1)$ $(3, -7)$ $(-3, -7)$

Find the requested trig function:

31. If $\csc \theta = 3$ and $\cos \theta < 0$, then $\tan \theta =$

- a. $-\sqrt{8}$ b. $\frac{\sqrt{8}}{8}$ c. $-\frac{\sqrt{8}}{8}$ d. $\sqrt{8}$

Simplify the following trig expressions:

32. $\frac{\tan \theta}{\sec \theta}$

- a. $\frac{\sin \theta}{\cos^2 \theta}$ b. $\frac{1}{\sin \theta}$ c. $-\sin \theta$ d. $\sin \theta$

33. $\frac{\sin^2 \theta}{1 - \cos \theta}$

- a. $1 - \cos \theta$ b. $-(1 + \cos \theta)$
c. $1 + \sin \theta$ d. $1 + \cos \theta$

34. $\cos 3x \cos x - \sin 3x \sin x$

- a. $\cos 4x$ b. $\cos 2x$ c. $\sin 4x$ d. $\sin 2x$

35. $\cos^4 x - 2 \cos^2 x + 1$

- a. $\cos^4 x$ b. $-\sin^4 x$ c. $\sin^4 x$ d. $\cos^4 x - \sin^2 x$

Evaluate the following inverse trig functions:

36. $\arctan(-1)$

- a. $\frac{\pi}{4}$ b. $-\frac{\pi}{4}$ c. $\frac{7\pi}{4}$ d. $\frac{3\pi}{4}, \frac{7\pi}{4}$

37. $\cot\left(\cos^{-1}\left(\frac{12}{13}\right)\right)$

- a. $\frac{5}{12}$ b. $\frac{12}{5}$ c. $-\frac{12}{5}$ d. $\frac{5}{13}$

38. $\cos\left(\sin^{-1}\left(\frac{1}{x}\right)\right)$

- a. $\frac{1}{\sqrt{x^2-1}}$ b. $\frac{\sqrt{x^2+1}}{x}$ c. $\sqrt{x^2-1}$ d. $\frac{\sqrt{x^2-1}}{x}$

For problems 39 – 42, let $\sin A = -\frac{9}{15}$, with A in QIII and $\cos B = \frac{5}{13}$ with B in QIV. Find the following:

39. $\sin 2A =$

- a. $\frac{120}{169}$ b. $\frac{24}{25}$ c. $-\frac{24}{25}$ d. $-\frac{120}{169}$

40. $\cos 2B =$

- a. $-\frac{119}{169}$ b. $\frac{119}{169}$ c. $-\frac{7}{25}$ d. $\frac{7}{25}$

41. $\sin(A + B) =$

- a. $\frac{63}{65}$ b. $-\frac{63}{65}$ c. $-\frac{33}{65}$ d. $\frac{33}{65}$

42. $\tan\left(\frac{A}{2}\right) =$

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

43. The solution(s) to $2 \sin \theta - 2 = 0$ for the interval $0 \leq \theta < 2\pi$ are:

- a. $0, \pi$ b. $\frac{3\pi}{2}$ c. $\frac{\pi}{2}$ d. $\frac{\pi}{6}, \frac{5\pi}{6}$

44. The solution(s) to $\sin 4x \cos 2x - \cos 4x \sin 2x = \frac{1}{2}$ for the interval $0 \leq \theta < 2\pi$ are:

- a. $\frac{\pi}{6}, \frac{5\pi}{6}$ b. $\frac{\pi}{6}, \frac{\pi}{3}$ c. $\frac{\pi}{12}$ d. $\frac{\pi}{12}, \frac{5\pi}{12}$

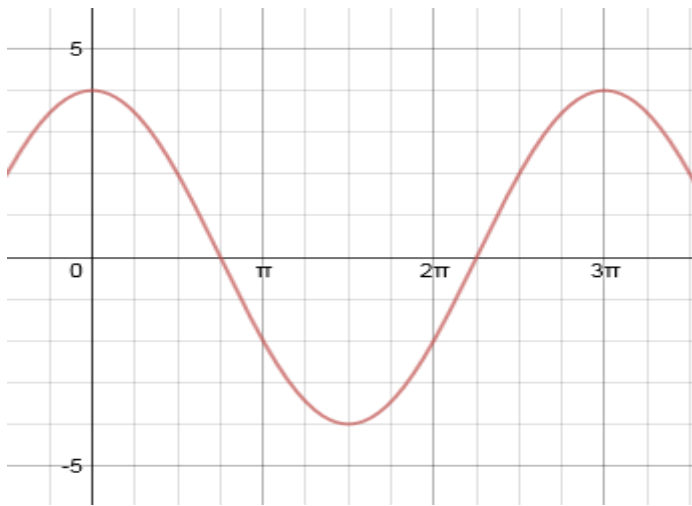
45. Identify the y – intercept of the graph of $y = -3 + \sin(3x)$

- a. (0, 3) b. (0, -3) c. (-3, 0) d. (3, 0)

46. Identify the period and the amplitude for the graph of $y = -2 \sin(2x)$

- a. Period = π Amplitude = -2 b. Period = π Amplitude = 2
 c. Period = 2π Amplitude = -2 d. Period = 2π Amplitude = 2

47. Find the equation that matches the graph of a trigonometric function below:



- a. $y = 4 \cos\left(\frac{2}{3}x\right)$ b. $y = 4 \cos(3x)$
 c. $y = -4 \cos\left(\frac{2}{3}x\right)$ d. $y = 4 \sin(3x)$

Solve the following trig applications problems:

48. The diagonals of a parallelogram are 56.0 cm and 34.0 cm. They intersect at an angle of 120° . Find the length of the shorter side.
- a. 39.5 cm b. 22.8 cm c. 24.6 cm d. 16.1 cm
49. A man goes for a hike. He walks 3.3 miles in the direction $S 44^\circ W$. He then turns and walks 2.2 miles in the direction $N 55^\circ W$. At that time, how far is he from his starting point?
- a. 2.2 miles b. 4.2 miles c. 3.9 miles d. 1.8 miles
50. A woman entering an outside glass elevator on the ground floor of a hotel glances up to the top of the building across the street and notices the angle of elevation is 48° . She rides the elevator up 3 floors (60 feet) and finds that the angle of elevation to the top of the building across the street is now 32° . How tall is the building across the street?
- a. 137 ft. b. 124 ft c. 105 ft d. 90 ft

ANSWER KEY

1. b

2. a

3. c

4. b

5. d

6. d

7. a

8. c

9. c

10. b

11. d

12. a

13. a

14. b

15. c

16. b

17. c

18. a

19. d

20. a

21. c

22. c

23. d

24. b

25. a

26. d

27. a

28. a

29. b

30. c

31. c

32. d

33. d

34. a

35. c

36. b

37. b

38. d

39. b

40. a

41. d

42. a

43. c

44. d

45. b

46. b

47. a

48. c

49. b

50. a