

Chapter 8 Homework Packet

Complete each problem on this sheet of paper & staple to your homework. If you choose not to print this paper, you **MUST** copy each problem. Show your work!

Set #1: Choose the best answer.

1. Which of the following is equivalent to the expression $\frac{\sin^2 x}{1 - \cos x}$?

A. $\tan x + \sin x$

B. $1 + \cos x$

C. $\csc x + \cot x$

D. $\tan x \cot x - \cos x$

E. $\cot x \sin x + \tan x$

2. Which of the following is equivalent to the expression $(\sec x + \tan x)(1 - \sin x)$?

A. $\cos x$

B. $\tan^2 x$

C. -1

D. $\sec x$

E. $\cot^2 x$

3. If $\sin \theta = -\frac{1}{3}$ and $\cos \theta < 0$, what is the value of $\cot \theta$?

A. $\frac{\sqrt{2}}{4}$

B. $2\sqrt{2}$

C. -3

D. $-\frac{2\sqrt{2}}{3}$

E. $-2\sqrt{2}$

4. Carol & Dave are in the California Redwood National Park. Carol looks up at a giant redwood tree at an angle of elevation of 37° . Dave is 100 feet closer to the tree than Carol & looks up at the tree at an angle of 44° . How tall is the tree. Round to 2 decimal places.

5. Simplify the following expression. Leave your answer as factored as possible.

$$\frac{4x-1}{2x^2+5x-3} - \frac{x+3}{6x^2+x-2}$$

6. Solve: $\sqrt{x+2} + \sqrt{3x+7} = 1$

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Set #2: Choose the best answer.

1. Which of the following is not equivalent to $(\tan x + 1)^2$?

A. $\tan^2 x + 1$

B. $\sec^2 x + 2 \tan x$

C. $\frac{1 + 2 \sin x \cos x}{\cos^2 x}$

D. $\tan^2 x + 2 \tan x + 1$

E. $\sec^2 x(1 + 2 \sin x \cos x)$

2. Given: $\sin \alpha = \frac{12}{13}$, $\cos \alpha < 0$, $\sin \beta = \frac{3}{5}$, and $\tan \beta > 0$, find $\cos(\alpha + \beta)$.

A. $-\frac{63}{65}$

B. $\frac{56}{65}$

C. $\frac{16}{65}$

D. $-\frac{16}{65}$

E. $-\frac{56}{65}$

3. Bacteria in a culture are growing exponentially with time, as shown in the table below.

Bacteria Growth

Day	Bacteria
0	100
1	200
2	400

Which of the following equation expresses the number of bacteria, y , present at time, t ?

A. $y = 100 + 2^t$

B. $y = (100) \cdot (2)^t$

C. $y = 2^t$

D. $y = (200) \cdot (2)^t$

4. $\log_6 40 =$

A. $\log_{10} 6 + \log_{10} 40$

B. $\log_{10} 6 - \log_{10} 40$

C. $(\log_{10} 6)(\log_{10} 40)$

D. $\frac{\log_{10} 40}{\log_{10} 6}$

5. Solve the triangle. Round all measures to 2 decimal places.

$\triangle XYZ$, $x = 5$, $y = 7$, $z = 10$

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Set #3: Choose the best answer.

1. Given: $\tan \alpha = -\frac{7}{24}$, $\cos \alpha > 0$, find $\sin 2\alpha$

- A. $-\frac{48}{7}$ B. $\frac{625}{84}$ C. $-\frac{168}{625}$ D. $-\frac{336}{625}$ E. $\frac{49}{600}$

2. Given: $\sin \alpha = \frac{5}{6}$, $\frac{\pi}{2} < \alpha < \pi$, and $\tan \beta = \frac{3}{7}$, $\pi < \beta < \frac{3\pi}{2}$. Find $\sin(\alpha - \beta)$.

- A. $\frac{35\sqrt{58} + 3\sqrt{638}}{348}$ B. $\frac{35\sqrt{58} - 3\sqrt{638}}{348}$ C. $\frac{-35\sqrt{58} - 3\sqrt{638}}{348}$
 D. $\frac{-35\sqrt{58} + 3\sqrt{638}}{348}$ E. None of these

3. $\sec 135^\circ \tan 30^\circ - \sin 240^\circ \cos 180^\circ$

- A. $\frac{-2\sqrt{6} - 3\sqrt{3}}{6}$ B. $\frac{-2\sqrt{6} + 3\sqrt{3}}{6}$ C. $\frac{2\sqrt{6} - 3\sqrt{3}}{6}$ D. $\frac{2\sqrt{6} + 3\sqrt{3}}{6}$ E. None of these

4. A small pulley 14 cm in diameter is connected by a belt to a larger pulley 22 cm in diameter. The small pulley is turning at 80 rpm.

- A. Find the linear velocity of the rim of the large pulley.
 B. Find the angular velocity of the large pulley in radians per hour.

5. If $\cos t = \frac{3}{5}$ and the terminal point for t is in quadrant IV, find $\cot t + \csc t$.

- (A) $-\frac{1}{2}$ (B) -2 (C) 2 (D) $\frac{1}{2}$ (E) $-\frac{5}{4}$

6. Solve the equation $2\cos^2 x + \sin x = 1$ in the interval $[0, 2\pi)$.

- (A) $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$ (B) $\frac{\pi}{6}, \frac{\pi}{3}, \frac{5\pi}{6}$ (C) $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$ (D) $\frac{\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$ (E) None of these

7. Solve: $9e^{5x} = 1269$. Round your answer to 2 decimal places.

8. Find all the zeros of the function $f(x) = x^4 - x^3 - 7x^2 + x + 6$

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Set #4: Choose the best answer.

1. Find the exact value of $\sec\left(\frac{11\pi}{12}\right)$.

- A. $\frac{-\sqrt{2}-\sqrt{6}}{4}$ B. $\frac{\sqrt{2}-\sqrt{6}}{4}$ C. $\sqrt{2}+\sqrt{6}$ D. $\sqrt{2}-\sqrt{6}$ E. None of these

2. If $\sin u = -\frac{12}{13}$ with $\pi < u < \frac{3\pi}{2}$, what does $\cos\frac{u}{2}$ equal?

- A. $-\frac{3\sqrt{13}}{13}$ B. $-\frac{\sqrt{26}}{26}$ C. $-\frac{2\sqrt{13}}{13}$ D. $\frac{\sqrt{13}}{13}$ E. None of these

3. Which of the following appears to form an identity with $\frac{2\sin^2 x + \cos 2x}{\sec x}$

- A. $\cos x$ B. $\frac{1-\sin x}{\cos x}$ C. $\frac{1+\sin x}{\cos x}$ D. $\frac{1+\csc x}{\csc x}$ E. None of these

4. If $\cos u = -\frac{3}{5}$ with $\frac{\pi}{2} < u < \pi$, what does $\tan 2u$ equal?

- A. $\frac{24}{25}$ B. $-\frac{24}{7}$ C. $\frac{24}{7}$ D. $-\frac{8}{7}$ E. None of these

5. Verify the identity: $\frac{\sin x + \cos x}{\sin x} - \frac{\cos x - \sin x}{\cos x} = \sec x \csc x$

6. Solve: $\log_2(x-3) + \log_2 x - \log_2(x+2) = 2$

7. A 95-ft tree casts a shadow that is 45 ft long. What is the angle of elevation of the sun?

- (A) 58.7° (B) 25.3° (C) 64.7° (D) 47.3° (E) 88.7°

8. The graph of $y = \csc x$ has the same set of asymptotes as the graph of $y =$

- (A) $\sin x$ (B) $\tan x$ (C) $\cot x$ (D) $\sec x$ (E) $\csc 2x$

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Set #5: Choose the best answer.

1. $\tan \alpha = \frac{8}{15}$, α is in quadrant III, find $\cos \frac{\alpha}{2}$

- A. $\frac{4\sqrt{17}}{17}$ B. $-\frac{4\sqrt{17}}{17}$ C. $\frac{\sqrt{17}}{17}$ D. $-\frac{\sqrt{17}}{17}$ E. None of these

2. Find the exact value of $\cos \frac{19\pi}{12}$

- A. $\frac{\sqrt{2}-\sqrt{6}}{4}$ B. $\frac{-\sqrt{2}+\sqrt{6}}{4}$ C. $\frac{-\sqrt{2}-\sqrt{6}}{4}$
 D. $\frac{\sqrt{2}+\sqrt{6}}{4}$ E. None of these

3. What is the measure of the smallest angle in a triangle with sides 12, 17, and 25?

- (A) 21° (B) 22° (C) 23° (D) 24° (E) 25°

4. Which of the following could be an intermediate expression in a proof of the identity

$$\tan x + \sec x = \frac{\cos x}{1 - \sin x} ?$$

- (A) $\sin x + \cos x$ (B) $\tan x + \csc x$ (C) $\frac{\sin x + 1}{\cos x}$ (D) $\frac{\cos x}{1 + \sin x}$ (E) $\cos x - \cot x$

5. Solve the equation $\tan x \cos x - \cos x = 0$ in the interval $[0, 2\pi)$.

- (A) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{2}$ (B) $0, \frac{\pi}{2}, \frac{\pi}{4}, \frac{5\pi}{4}, \frac{3\pi}{2}$ (C) $0, \frac{\pi}{2}, \frac{3\pi}{4}$ (D) $\frac{\pi}{4}, \frac{5\pi}{4}$ (E) $0, \frac{\pi}{2}$

6. Find all the zeros of the function $f(x) = x^4 + 2x^3 + 10x^2 + 36x - 144$

7. Simplify: $\frac{x^2 - x - 12}{x^2 + x - 30} \cdot \frac{x^2 + 5x + 6}{x^2 - 2x - 3} \div \frac{x + 3}{x^2 + 7x + 6}$. Leave your answer as factored as possible.

8. Solve: $\frac{x+4}{2x-1} \leq 3$

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Set #6: Choose the best answer.

1. Find all solutions in the domain $[0, 2\pi)$ for the equation $\sin x - \cos x = 1$

- A. $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$ B. $0, \pi$ C. $\frac{\pi}{2}, \frac{3\pi}{2}$ D. $0, \frac{\pi}{2}$ E. $\frac{\pi}{2}, \pi$

2. Find all solutions in the domain $[0, 2\pi)$ for the equation $\cos 2x + 5 \cos x + 3 = 0$

- A. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ B. $\frac{2\pi}{3}, \frac{4\pi}{3}$ C. $\frac{\pi}{3}, \frac{5\pi}{3}$ D. $\frac{2\pi}{3}, \frac{5\pi}{3}$ E. No solution

3. If the point $\left(\frac{-3\sqrt{13}}{13}, \frac{2\sqrt{13}}{13}\right)$ lies on the unit circle & corresponds to the angle t , find the value of $\cot t$.

- A. $\frac{-2\sqrt{13}}{13}$ B. $\frac{-3\sqrt{13}}{13}$ C. $-\frac{2}{3}$ D. $-\frac{3}{2}$ E. None of these

4. A water wheel has a radius of 25 feet. The wheel is rotating at 20 rpm. Find the linear speed, in feet per second, of the water.

5. A 200 foot guy wire is attached to the top of a tower. If the wire makes a 55° angle with the ground, how tall is the tower?

- (A) 163.8 ft (B) 90 ft (C) 265 ft (D) 85.4 ft (E) 255.6 ft

6. Find the period of the function $y = \frac{1}{4} \tan\left(\frac{x}{2} + \frac{\pi}{8}\right)$.

- (A) 2π (B) 4π (C) π (D) 8π (E) $\frac{\pi}{2}$

7. Given: $\cot \theta = -3$ and $\csc \theta > 0$, find the exact value of $\sec 2\theta$.

8. Find the exact value of $\sin \frac{13\pi}{12}$ using the angle sum or difference formulas.

9. Find the exact value of $\tan 67.5^\circ$

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For questions 10-12, verify each identity:

10. $\tan 2x = 2 \sin x \cos x \sec 2x$

11. $\sec(x + y) = \frac{\sec x \sec y}{1 - \tan x \tan y}$

12. $\sin x - \cos 2x = (2 \sin x - 1)(\sin x + 1)$

Complete this worksheet on a **SEPARATE SHEET OF PAPER**. You **MUST** copy each problem. Show your work! All graphs must be on graph paper.

Set #7:

For questions 1-3, simplify each expression as much as possible. Leave your answers as factored as possible.

$$1. \frac{2x-3}{x^2+8x+7} - \frac{x-2}{(x+1)^2}$$

$$2. \frac{\frac{x-2}{x+2} + \frac{x-1}{x+1}}{\frac{x}{x+1} - \frac{2x-3}{x}}$$

$$3. \frac{x+4}{x^2-x-2} - \frac{2x+3}{x^2+2x-8}$$

For questions 4-6, solve each equation.

$$4. 4x^2 + 12x = -9$$

$$5. \sqrt{3x-5} - \sqrt{x+7} = 2$$

$$6. \frac{x+2}{x+3} + \frac{1}{x^2+2x-3} - 1 = 0$$

For questions 7-8, find all the zeros of each function.

$$7. f(x) = 6x^3 - 16x^2 + 9x - 24$$

$$8. f(x) = 4x^4 - x^3 + 5x^2 - 2x - 6$$

9. Solve the triangle: $\triangle ABC$, $a = 16$, $b = 18$, $A = 60^\circ$. Round all measures to 2 decimal places.

10. Two fire-lookout stations are 10 miles apart, with station B directly east of station A. Both stations spot a fire. The bearing of the fire from station A is $N 25^\circ E$ and the bearing of the fire from station B is $N 56^\circ W$. How far, to the nearest tenth of a mile, is the fire from each lookout station?

11. A Little League baseball diamond has four bases forming a square whose sides measure 60 feet each. The pitcher's mound is 46 feet from home plate on a line joining home plate & second base. Find the distance from the pitcher's mound to third base. Round to the nearest tenth of a foot.

12. Two cars leave a city at the same time & travel along straight highways that differ in direction by 80° . One car averages 60 mph and the other averages 50 mph. How far apart will the cars be after 30 minutes? Round to the nearest tenth of a mile.

13. A building that is 21 meters tall casts a shadow 25 meters long. Find the angle of elevation of the sun to the nearest degree.

14. A hiker climbs for a half mile up a slope whose inclination is 17° . How many feet in altitude, to the nearest foot, does the hiker gain?

For questions 15-22, graph each function on graph paper. Find all the important parts (equations of asymptotes, vertex points, zeros, coordinates of holes, etc.). Show the translations for each trig function graphed...the other functions do NOT need translations shown! Except for the trig functions, all functions should have a table of values shown!

$$15. f(x) = 4 - 2\sin\left(2x + \frac{\pi}{4}\right)$$

$$16. f(x) = 1 - 3\tan\left(x - \frac{\pi}{2}\right)$$

$$17. f(x) = -4 + 3\sec 4\left(x - \frac{\pi}{4}\right)$$

$$18. f(x) = 2x^2 + 4x - 3$$

$$19. f(x) = \frac{3x^2 + x - 4}{2x^2 - 5x}$$

$$20. f(x) = \frac{4x^2 - 5x - 6}{x^2 - 8x + 12}$$

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$$21. f(x) = -\frac{3}{4}|x+2| + 6$$

$$22. f(x) = -2\sqrt{6-3x} + 8$$