

Trig Derivatives Quiz Review WS #3

$\frac{d}{dx} \sin u = \cos u * u'$	$\frac{d}{dx} \cos u = -\sin u * u'$
$\frac{d}{dx} \tan u = \sec^2 u * u'$	$\frac{d}{dx} \cot u = -\csc^2 u * u'$
$\frac{d}{dx} \sec u = \sec u \tan u * u'$	$\frac{d}{dx} \csc u = -\csc u \cot u * u'$

Power Rule: $\frac{d}{dx} [x^n] = n * x^{n-1}$

Product Rule:

$$\frac{d}{dx} [f(x)g(x)] = f'g + fg'$$

Quotient Rule:

$$\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{f'g - fg'}{g^2}$$

Chain Rule:

$$\frac{d}{dx} f[g(x)] = f'[g(x)] \times g'(x)$$

Find the derivative of the following equations

1) $y = 4x^3 \cos(2 - 3x^2)$

2) $g(x) = \frac{3\sin(9-3x)}{\csc(5x^2-x)}$

3) $f(x) = 2\sec^5(4\pi - 5x^3)$

$$4) y \sec x = 12 - 3y + 5x^2$$

$$5) \csc^4 y - 5y = 2x^3 - 2\cos(1 - 2x)$$

$$6) g(x) = \sqrt[7]{\tan(1 - 5x^3)}$$

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Key

$\frac{d}{dx} \sin u = \cos u * u'$	$\frac{d}{dx} \cos u = -\sin u * u'$
$\frac{d}{dx} \tan u = \sec^2 u * u'$	$\frac{d}{dx} \cot u = -\csc^2 u * u'$
$\frac{d}{dx} \sec u = \sec u \tan u * u'$	$\frac{d}{dx} \csc u = -\csc u \cot u * u'$

Power Rule: $\frac{d}{dx} [x^n] = n * x^{n-1}$

Product Rule:

$$\frac{d}{dx} [f(x)g(x)] = f'g + fg'$$

Quotient Rule:

$$\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{f'g - fg'}{g^2}$$

Chain Rule:

$$\frac{d}{dx} f[g(x)] = f'[g(x)] * g'(x)$$

Find the derivative of the following equations

1) $y = 4x^3 \cos(2 - 3x^2)$

$$y' = \overbrace{12x^2 \cdot \cos(2-3x^2)}^{f'g} + \overbrace{4x^3 \cdot -\sin(2-3x^2) \cdot -6x}^{fg'}$$

* product rule: $f'g + fg'$

$$y' = 12x^2 \cos(2-3x^2) + 24x^4 \sin(2-3x^2)$$

2) $g(x) = \frac{3\sin(9-3x)}{\csc(5x^2-x)}$

* quotient rule

$$g'(x) = \frac{\overbrace{3\cos(9-3x)(-3)}^{f'} \cdot \overbrace{\csc(5x^2-x)}^g - \overbrace{3\sin(9-3x)}^f \cdot \overbrace{-\csc(5x^2-x)\cot(5x^2-x)(10x-1)}^{g'}}{\csc^2(5x^2-x)}$$

$$g'(x) = \frac{-9\cos(9-3x)\csc(5x^2-x) + 3(10x-1)\sin(9-3x)\csc(5x^2-x)\cot(5x^2-x)}{\csc^2(5x^2-x)}$$

3) $f(x) = 2\sec^5(4\pi - 5x^3)$

$$f(x) = 2[\sec(4\pi - 5x^3)]^5$$

out: 2
in: $\sec(4\pi - 5x^3)$
inner: $4\pi - 5x^3$

$$f'(x) = 10(\sec(4\pi - 5x^3))^4 \cdot \sec(4\pi - 5x^3) \tan(4\pi - 5x^3) \cdot -15x^2$$

$$f'(x) = -150x^2 \sec^5(4\pi - 5x^3) \tan(4\pi - 5x^3)$$

$$4) y \sec x = 12 - 3y + 5x^2$$

* implicit, product rule

$$\frac{f'}{g} + \frac{f}{g'} = -3\left(\frac{dy}{dx}\right) + 10x$$

$$\sec x \left(\frac{dy}{dx}\right) + 3\left(\frac{dy}{dx}\right) = 10x - y \sec x \tan x$$

$$\frac{dy}{dx} (\sec x + 3) = 10x - y \sec x \tan x$$

$$\frac{dy}{dx} = \frac{10x - y \sec x \tan x}{\sec x + 3}$$

$$5) \csc^4 y - 5y = 2x^3 - 2\cos(1-2x)$$

* implicit, chain rule

$$[\csc y]^4 - 5y = 2x^3 - 2\cos(1-2x)$$

out: $()^4$
in: $\csc y$

$$4(\csc y)^3 \cdot \csc y \cot y \cdot \left(\frac{dy}{dx}\right) - 5\left(\frac{dy}{dx}\right) = 6x^2 + 2\sin(1-2x)(-2)$$

inner: y

$$\frac{dy}{dx} (-4\csc^4 y \cot y - 5) = 6x^2 - 4\sin(1-2x)$$

$$\frac{dy}{dx} = \frac{6x^2 - 4\sin(1-2x)}{-4\csc^4 y \cot y - 5}$$

$$6) g(x) = \sqrt[7]{\tan(1-5x^3)} \quad * \text{chain rule}$$

$$g(x) = [\tan(1-5x^3)]^{1/7}$$

out: $()^{1/7}$

in: $\tan u$

inner: $1-5x^3$

$$g'(x) = \frac{1}{7} [\tan(1-5x^3)]^{-6/7} \cdot \sec^2(1-5x^3) \cdot -15x^2$$

$$g'(x) = \frac{-15x^2 \sec^2(1-5x^3)}{7(\tan(1-5x^3))^{6/7}}$$

H-Pre-Calculus
Trig Values Worksheet

Evaluate each of the following -- exact values only. Do these without

e.

1. $\sin\left(\frac{5\pi}{6}\right) =$

2. $\cos\left(\frac{5\pi}{3}\right)$

3. $\sin\left(\frac{-5\pi}{4}\right) =$

4. $\cos\left(\frac{3\pi}{4}\right)$

5. $\sin\left(\frac{5\pi}{3}\right) =$

6. $\cos\left(\frac{\pi}{2}\right)$

7. $\cos\left(\frac{-4\pi}{3}\right) =$

8. $\sin\left(\frac{-2\pi}{3}\right)$

9. $\sin\left(\frac{7\pi}{4}\right) =$

10. $\cos\left(\frac{7\pi}{6}\right) =$

11. $\sin\left(\frac{3\pi}{2}\right) =$

12. $\cos(-\pi)$

13. $\tan\left(\frac{5\pi}{4}\right) =$

14. $\tan\left(\frac{-\pi}{3}\right) =$

15. $\tan\left(\frac{7\pi}{6}\right) =$

16. $\tan(\pi) =$

17. $\tan\left(\frac{2\pi}{3}\right) =$

18. $\tan\left(\frac{\pi}{2}\right) =$

19. $\tan\left(\frac{7\pi}{4}\right) =$

20. $\tan\left(\frac{11\pi}{6}\right) =$

21. $\sec(2\pi) =$

22. $\csc\left(-\frac{\pi}{6}\right) =$

23. $\cot\left(\frac{2\pi}{3}\right) =$

24. $\sec\left(\frac{4\pi}{3}\right) =$

25. $\csc(3\pi) =$

26. $\cot\left(\frac{7\pi}{6}\right) =$

27. $\sec\left(\frac{-\pi}{2}\right) =$

28. $\csc\left(\frac{3\pi}{2}\right) =$

29. $\cot\left(\frac{3\pi}{2}\right) =$

30. $\sec\left(-\frac{5\pi}{6}\right) =$

31. $\csc\left(-\frac{3\pi}{4}\right) =$

32. $\cot(-\pi) =$

Evaluate each of the following -- exact values only.

33. $\cot\left(\frac{\pi}{2}\right) + 3\sin\left(\frac{3\pi}{2}\right)$

34. $\tan(0) - 6\sin\left(\frac{\pi}{2}\right)$

35. $3\sec(\pi) - 5\tan(4\pi)$

36. $4\csc\left(\frac{3\pi}{2}\right) + 3\cos(\pi)$

37. $2\sec(0) + 4\cot^2\left(\frac{\pi}{2}\right) + \cos(2\pi)$

38. $\sin^2\left(\frac{2\pi}{3}\right) + \cos^2\left(\frac{2\pi}{3}\right) =$

39. $\cot^2\left(\frac{3\pi}{4}\right) - \sin\left(\frac{\pi}{6}\right) + 4\tan\left(\frac{\pi}{3}\right)$

40. $\cos^2\left(\frac{\pi}{3}\right) + \sec^2\left(\frac{5\pi}{6}\right) - \csc^2\left(\frac{7\pi}{6}\right)$

41. $\cot\left(\frac{\pi}{6}\right) + \tan\left(\frac{\pi}{3}\right) - \sin\left(\frac{4\pi}{3}\right)$

42. $\sin^2\left(\frac{5\pi}{4}\right) - \cos^2\left(\frac{3\pi}{2}\right) + \tan\left(\frac{4\pi}{3}\right)$

Key

H-Pre-Calculus
Trig Values Worksheet

Evaluate each of the following -- exact values only. Do these without using your unit circle.

1. $\sin\left(\frac{5\pi}{6}\right) = \frac{1}{2}$

2. $\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$

3. $\sin\left(\frac{-5\pi}{4}\right) = \frac{\sqrt{2}}{2}$

4. $\cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

5. $\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

6. $\cos\left(\frac{\pi}{2}\right) = 0$

7. $\cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$

8. $\sin\left(\frac{-2\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

9. $\sin\left(\frac{7\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

10. $\cos\left(\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

11. $\sin\left(\frac{3\pi}{2}\right) = -1$

12. $\cos(-\pi) = -1$

13. $\tan\left(\frac{5\pi}{4}\right) = 1$

14. $\tan\left(\frac{-\pi}{3}\right) = -\sqrt{3}$

15. $\tan\left(\frac{7\pi}{6}\right) = \frac{1}{\sqrt{3}}$

16. $\tan(\pi) = 0$

17. $\tan\left(\frac{2\pi}{3}\right) = -\sqrt{3}$

18. $\tan\left(\frac{\pi}{2}\right) = \text{undefined}$

19. $\tan\left(\frac{7\pi}{4}\right) = -1$

20. $\tan\left(\frac{11\pi}{6}\right) = -\frac{1}{\sqrt{3}}$

21. $\sec(2\pi) = 1$

22. $\csc\left(-\frac{\pi}{6}\right) = -2$

23. $\cot\left(\frac{2\pi}{3}\right) = -\frac{1}{\sqrt{3}}$

24. $\sec\left(\frac{4\pi}{3}\right) = -2$

25. $\csc(3\pi) = \text{undefined}$

26. $\cot\left(\frac{7\pi}{6}\right) = \sqrt{3}$

$$27. \sec\left(\frac{-\pi}{2}\right) = \text{undefined}$$

$$28. \csc\left(\frac{3\pi}{2}\right) = -1$$

$$29. \cot\left(\frac{3\pi}{2}\right) = 0$$

$$30. \sec\left(-\frac{5\pi}{6}\right) = \frac{-2}{\sqrt{3}}$$

$$31. \csc\left(-\frac{3\pi}{4}\right) = \frac{-2}{\sqrt{2}}$$

$$32. \cot(-\pi) = \text{undefined}$$

Evaluate each of the following -- exact values only.

$$33. \cot\left(\frac{\pi}{2}\right) + 3\sin\left(\frac{3\pi}{2}\right)$$

$$0 + 3(-1)$$

$$\textcircled{-3}$$

$$34. \tan(0) - 6\sin\left(\frac{\pi}{2}\right)$$

$$0 - 6(1)$$

$$\textcircled{-6}$$

$$35. 3\sec(\pi) - 5\tan(4\pi)$$

$$3(-1) - 5(0)$$

$$\textcircled{-3}$$

$$36. 4\csc\left(\frac{3\pi}{2}\right) + 3\cos(\pi)$$

$$4(-1) + 3(-1)$$

$$\textcircled{-7}$$

$$37. 2\sec(0) + 4\cot^2\left(\frac{\pi}{2}\right) + \cos(2\pi)$$

$$2(1) + 4(0)^2 + 1$$

$$\textcircled{3}$$

$$38. \sin^2\left(\frac{2\pi}{3}\right) + \cos^2\left(\frac{2\pi}{3}\right) = 1$$

$$\textcircled{1}$$

$$39. \cot^2\left(\frac{3\pi}{4}\right) - \sin\left(\frac{\pi}{6}\right) + 4\tan\left(\frac{\pi}{4}\right)$$

$$(-1)^2 - \left(\frac{1}{2}\right) + 4(1)$$

$$\textcircled{4\frac{1}{2}}$$

$$40. \cos^2\left(\frac{\pi}{3}\right) + \sec^2\left(\frac{5\pi}{6}\right) - \csc^2\left(\frac{7\pi}{6}\right)$$

$$\left(\frac{1}{2}\right)^2 + \left(\frac{-2}{\sqrt{3}}\right)^2 - (-2)^2$$

$$\frac{1}{4} + \frac{4}{3} - 4 = \frac{3+16-48}{12} = \frac{-29}{12}$$

$$\textcircled{\frac{-29}{12}}$$

$$41. \cot\left(\frac{\pi}{6}\right) + \tan\left(\frac{\pi}{3}\right) - \sin\left(\frac{4\pi}{3}\right)$$

$$\sqrt{3} + \sqrt{3} - \left(-\frac{\sqrt{3}}{2}\right)$$

$$2\sqrt{3} + \frac{\sqrt{3}}{2}$$

$$\frac{4\sqrt{3} + \sqrt{3}}{2} = \frac{5\sqrt{3}}{2}$$

$$42. \sin^2\left(\frac{5\pi}{4}\right) - \cos^2\left(\frac{3\pi}{2}\right) + \tan\left(\frac{4\pi}{3}\right)$$

$$\left(\frac{\sqrt{2}}{2}\right)^2 - (0)^2 + \sqrt{3}$$

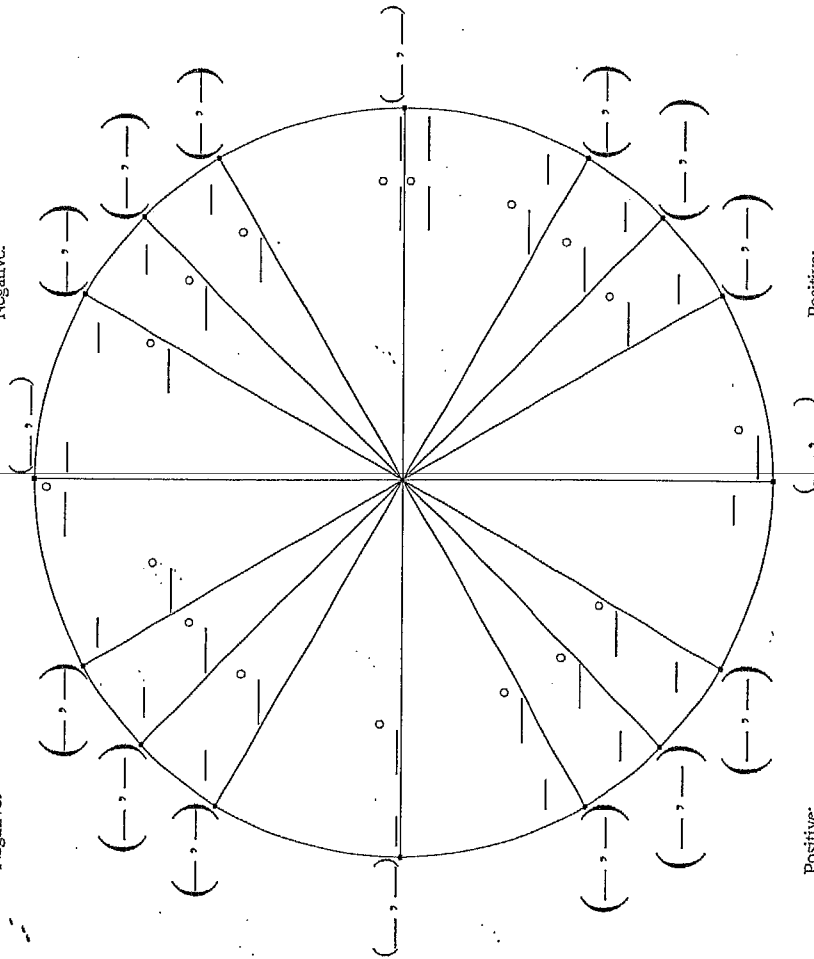
$$\frac{1}{2} + \sqrt{3}$$

$$\textcircled{\frac{1+\sqrt{3}}{2}}$$

Fill in The Unit Circle

Positive: _____
Negative: _____

Positive: _____
Negative: _____



Positive: _____
Negative: _____

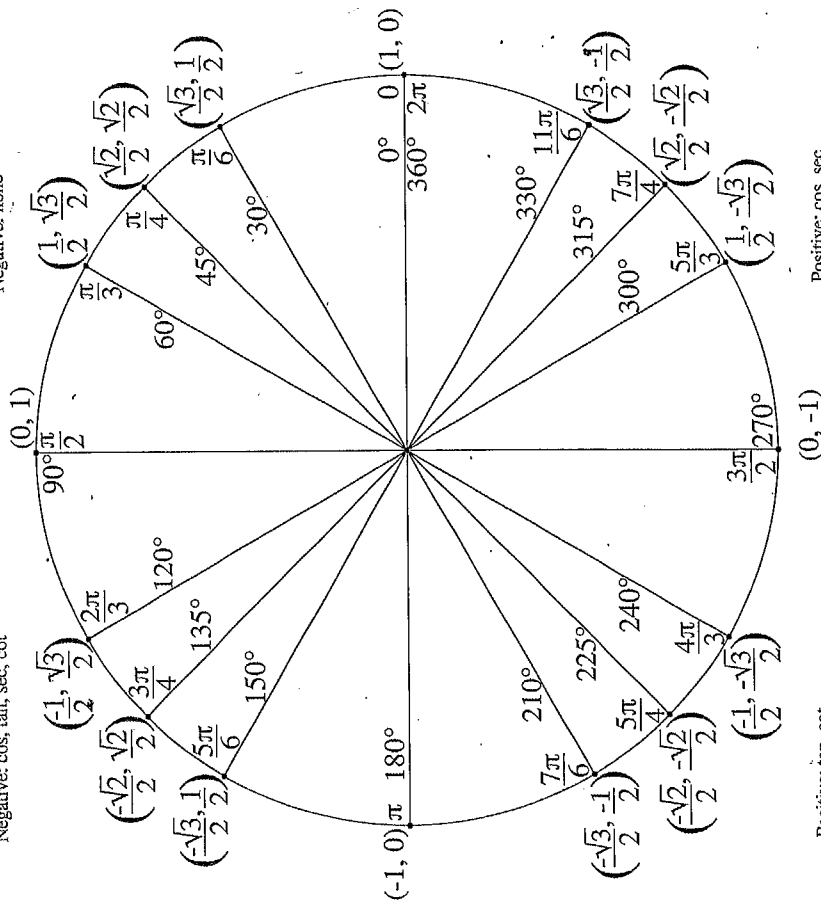
Positive: _____
Negative: _____

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The Unit Circle

Positive: sin, csc
Negative: cos, tan, sec, cot

Positive: sin, cos, tan, sec, csc, cot
Negative: none



Positive: tan, cot
Negative: sin, cos, sec, csc

(0, -1)

Positive: cos, sec
Negative: sin, tan, csc, cot

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