Derivatives of sin(x) and cos(x)

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Name: _____ Date: _____ Score: _____

Find the derivative of each function. Show all work.

Calculus 1 Worksheet #15
Derivative of sin(x) and cos(x)

Notes: Know the following theorems.

1. $\frac{d(\sin\square)}{dx} = \cos\square \bullet \frac{d\square}{dx}$	2. $\frac{d(\cos\square)}{dx} = -\sin\square \bullet \frac{d\square}{dx}$

Examples:

1. $y = \sin 5x$ $\quad y = \sin 5x$ $y' = 5\cos 5x$ $\quad y' = 5\cos 5x$	2. $y = \cos 9x$ $y' = -9\sin 9x$	3. $y = 3\sin^4 x$ $y' = 4(3)\sin^3 x(\cos x) = 12\cos x \sin^3 x$

Directions: Find dy/dx. Factor out common terms.

1. $y = \sin 3x$	2. $y = -5\cos 2x$	3. $y = \sin^2 x$
4. $y = 4\cos^2 x$	5. $y = \sin^2 x + \cos^2 x$	6. $y = 2\cos x - 3\sin x$
7. $y = \sin x \cos x$	8. $y = \frac{\sin x}{x^2}$	9. $y = x^2 \cos x + \sin x$
10. $y = x^3 \sin x - 5\cos x$	11. $y = \sin x + \cos x$	12 $y = 2x(\cos x)$.
13. $y = 4x^2(\cos x)$	14. $y = x(\sin x) + \cos x$	15. $y = 3\sin x - x(\cos x)$
16. $y = 4\sin x(\cos x)$	17. $y = x^2(\sin x) + 2x(\cos x)$	18. $y = x^2(\cos x) - 2x(\sin x) - 2\cos x$

19. What is the domain of $f(x) = \sqrt{16 - x^2}$

20. Is $f(x) = \frac{4x^3 - x^2}{x}$ even, odd or neither?

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Answer key — for instructor use only.

Answers:

1. $3\cos 3x$	2. $10\sin 2x$	3. $\sin 2x$	4. $-4\sin 2x$
5.0	6. $-2\sin x - 3\cos x$	7. $\cos 2x$	8. $\frac{x\cos x - 2\sin x}{x^3}$
9. $2x\cos x - x^2\sin x + \cos x$	10. $3x^2\sin x + x^3\cos x + 5\sin x$	11. $\cos x - \sin x$	12. $2(\cos x - x\sin x)$
13. $4x(2\cos x - x\sin x)$	14. $x\cos x$	15. $2\cos x + x\sin x$	16. $4\cos 2x$
17. $\cos x(x^2+2)$	18. $-x^2\sin x$	19. $[-4,4]$	20. Neither