Calculus   Worksheet #3   Unit 6 Selected Solutions

Find dy/dx for each of the following.

If $y = \sin(u)$ where $u = f(x)$,
then $dy/dx = \cos(u)\, du/dx$.

1. $y = \sin(2x + 5)$

$dy/dx = [\cos(2x + 5)]\,(2)$

  $dy/dx = 2\cos(2x + 5)$

If $y = \cos(u)$ where $u = f(x)$,
then $dy/dx = -\sin(u)\, du/dx$.

4. $y = \cos(x^2 + 4)$

$dy/dx = [-\sin(x^2 + 4)]\,(2x)$

  $dy/dx = -2x\sin(x^2 + 4)$

If $y = \tan(u)$ where $u = f(x)$,
then $dy/dx = \sec^2(u)\, du/dx$.

5. $y = \tan(1 - 3x)$

$dy/dx = [\sec^2(1 - 3x)]\,(-3)$

  $dy/dx = -3\sec^2(1 - 3x)$

If $y = \sec(u)$ where $u = f(x)$,
then $dy/dx = \sec(u)\tan(u)\, du/dx$.

8. $y = \sec(x^5)$

$dy/dx = [\sec(x^5)\tan(x^5)]\,(5x^4)$

  $dy/dx = 5x^4\sec(x^5)\tan(x^5)$

If $y = \cot(u)$ where $u = f(x)$,
then $dy/dx = -\csc^2(u)\, du/dx$.

9. $y = \cot(7x + 9)$

$dy/dx = [-\csc^2(7x + 9)]\,(7)$

  $dy/dx = -7\csc^2(7x + 9)$

If $y = \csc(u)$ where $u = f(x)$,
then $dy/dx = -\csc(u)\cot(u)\, du/dx$.

12. $y = \csc(x^2 - 5)$

$dy/dx = [-\csc(x^2 - 5)\cot(x^2 - 5)]\,(2x)$

  $dy/dx = -2x\csc(x^2 - 5)\cot(x^2 - 5)$

If $y = u^n$ where $u = f(x)$, then $dy/dx = n(u^{n-1})\, du/dx$.

13. $y = \sin^5(x) = [\sin(x)]^5$

$dy/dx = 5\sin^4(x)\,[\cos(x)]\,(1)$

  $dy/dx = 5\sin^4(x)\cos(x)$

16. $y = \cos^6(3x^2) = [\cos(3x^2)]^6$

$dy/dx = 6\cos^5(3x^2)\,[-\sin(3x^2)]\,(6x)$

  $dy/dx = -36x\cos^5(3x^2)\sin(3x^2)$

17. $y = \tan^3(1 - 5x) = [\tan(1 - 5x)]^3$

$dy/dx = 3\tan^2(1 - 5x)\,[\sec^2(1 - 5x)]\,(-5)$

$dy/dx = -15\tan^2(1 - 5x)\sec^2(1 - 5x)$

20. $y = \sec^3(9 - x^2) = [\sec(9 - x^2)]^3$

$dy/dx = 3\sec^2(9 - x^2)\,[\sec(9 - x^2)\tan(9 - x^2)]\,(-2x)$

  $dy/dx = -6x\sec^3(9 - x^2)\tan(9 - x^2)$

21. $y = \cot^3(8x) = [\cot(8x)]^3$

$dy/dx = 3\cot^2(8x)\,[-\csc^2(8x)]\,(8)$

  $dy/dx = -24\cot^2(8x)\csc^2(8x)$

24. $y = \csc^6(7 - 2x) = [\csc(7 - 2x)]^6$

$dy/dx = 6\csc^5(7 - 2x)\,[-\csc(7 - 2x)\cot(7 - 2x)]\,(-2)$

  $dy/dx = 12\csc^6(7 - 2x)\cot(7 - 2x)$