Calculus: Homework #8 Solutions

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Page 138, #1-20:

#1: $f(x) = x^3/\sin x \qquad f' = 3x^2/\sin x + x^3/\sin^2 x \cdot \cos x$

#2: $f(x) = x^4/\cos x \qquad f' = 4x^3/\cos x - x^4/\cos^2 x \cdot \sin x$

#3: $g(x) = \cos^3 x/x^5 \qquad g' = 3\cos^2 x/x^5 - 5\cos^3 x/x^6$

#4: $h(x) = \sin^5 x/x^3 \qquad h' = 5\sin^4 x/x^3 - 3\sin^5 x/x^4$

#5: $y = \sin 10x/\cos 20x \qquad y' = 10\cos 10x/\cos 20x + 10\sin 20x \;\; \sin 10x/\cos^2 20x$

#6: $y = \cos 12x/\sin 18x \qquad y' = -12\sin 12x/\sin 18x - 18\cos 18x \;\; \cos 12x/\sin^2 18x$

#7: $y = (3x-7)/(6x+5) \qquad y' = 3/(6x+5) - 6(3x-7)/(6x+5)^2$

#8: $y = (10x+9)/(5x-3) \qquad y' = 10/(5x-3) - 5(10x+9)/(5x-3)^2$

#9: $z = (8x+1)^6/(5x-2)^9 \qquad z' = 48(8x+1)^5/(5x-2)^9 - 45(8x+1)^6/(5x-2)^{10}$

#10: $A = (4x-1)^7/(7x+2)^4 \qquad A' = 28(4x-1)^6/(7x+2)^4 - 28(4x-1)^7/(7x+2)^5$

#11: $P = (5x^2-10x+3)/(3x^2+6x-8)$
$P' = (10x-10)/(3x^2+6x-8) - (6x+6)(5x^2-10x+3)/(3x^2+6x-8)^2$

#12: $r = (4x^2+8x+1)/(4x^2-8x+3) \qquad r' = (8x+8)/(4x^2-8x+3) - (8x-8)(4x^2+8x+1)/(4x^2-8x+3)^2$

#13: $d/dx(60x^{-4/3}) \qquad y' = (-4/3)60x^{-7/3}$

#14: $d/dx(24x^{-7/3}) \qquad y' = (-7/3)24x^{-11/3}$

#15: $r(x) = 12/x^3 \qquad r' = -3 \cdot 12x^{-4}$

#16: $t(x) = 51/x^7 \qquad t' = -7 \cdot 51x^{-8}$

#17: $\nu = 14/\cos 0.5x \qquad \nu' = 14/\cos^2 0.5x \cdot 0.50 \sin 0.5x$

#18: $a(x) = 20/\sin^2 x \qquad a' = -2 \cdot 20/\sin^3 x \cdot \cos x$

#19: $e(x) = 1/x \qquad e' = -1/x^2$

#20: $s(x) = 1/x^2 \qquad s' = -2/x^3$

Page 143, q1 - q10:

q1) cos x

q2) cos x

q3) 1

q4) sin x + x cos x

q5) sec x - x sin x / $\cos^2$ x

q6) $(-15/7)(3x)^{-12/7}$

q7) 3 $\cos^{-4}$ x sin x

q8) Since $(x^2 - 7x + 10) = (x - 5)(x - 2)$, the limit is (2 - 5) = - 3

q9) dj/dp

q10) The graph is sec x, so the derivative will look like tan x.

Page 143, #1-10:

#1: $f(x) = \tan 5x \qquad f' = 5\sec^2 5x$

#2: $f(x) = \sec 3x \qquad f' = 3\sec 3x \tan 3x$

#3: $y = \sec 7x \qquad y' = 7\sec 7x \tan 7x$

#4: $z = \tan 9x \qquad z' = 9\sec^2 9x$

#5: $g(x) = \cot 11x \qquad g' = -11\csc^2 11x$

#6: $h(x) = \csc 10x \qquad h' = -10\csc 10x \cot 10x$

#7 $r(x) = \csc 20x \qquad r' = -20\csc 20x \cot 20x$

#8: $p(x) = \cot 31x \qquad p' = -31csc^2 31x$

#9: $y = \tan^5 4x \qquad y' = 5\tan^4 4x \cdot sec^2 4x \cdot 4$

#10: $y = \tan^7 9x \qquad f' = 7\tan^6 9x \cdot sec^2 9x \cdot 9$

Page 151, q1 - q10:

q1) cos x

q2) -sin x

q3) $\sec^2$ x

q4) $-\csc^2$ x

q5) sec x tan x

q6) -csc x cot x

q7) The slope of a vertical line is infinite.

q8) The derivative at the cusp is discontinuous.

q9) The slope is about (2 - 4)/(5 - 3) = -1

q10) The slope of a horizontal line is zero.