Differentiation Techniques

Practice – Find y':

1) $y = \frac{t-2}{2t+1}$ $\quad y' = \frac{(t-2)'(2t+1) - (t-2)(2t+1)'}{(2t+1)^2} = \frac{(1)(2t+1) - (t-2)(2)}{(2t+1)^2} = \frac{2t+1-2t+4}{(2t+1)^2}$

$= \frac{5}{(2t+1)^2}$

2) $y = \left(\frac{t-2}{2t+1}\right)^9$ $\quad y' = 9\left(\frac{t-2}{2t+1}\right)^8\left(\frac{t-2}{2t+1}\right)' = 9\left(\frac{t-2}{2t+1}\right)^8\left(\frac{5}{(2t+1)^2}\right) = \frac{45(t-2)^8}{(2t+1)^{10}}$

3) $y = (2x+1)^5(x^3-x+1)$

$y' = \left[(2x+1)^5\right]'(x^3-x+1) + (2x+1)^5\left[(x^3-x+1)\right]'$

$= 5(2x+1)^4(2x+1)'(x^3-x+1) + (2x+1)^5(3x^2-1)$

$= 10(2x+1)^4(x^3-x+1) + (2x+1)^5(3x^2-1)$

4) $y = \sin(x)\cos(x)$ $\quad y' = (\sin(x))'\cos(x) + \sin(x)(\cos(x))'$

$= \cos(x)\cos(x) + \sin(x)(-\sin(x)) = \cos^2(x) - \sin^2(x)$

5) $y = \sin(\cos(x))$ $\quad y' = \cos(\cos(x))(-\sin(x)) = -\cos(\cos(x))\sin(x)$

6) $y = \sqrt{x+\sqrt{x}}$ $\quad y' = \frac{1}{2}(x+x^{1/2})^{-1/2}\left(1+\frac{1}{2}x^{-1/2}\right)$

$= (x+x^{1/2})^{1/2}$

7) $y = \sin(x\cdot\tan(x))$ $\quad y' = \cos(x\cdot\tan(x))(x\cdot\tan(x))'$

$= \cos(x\cdot\tan(x))((1)\tan(x) + x(\sec^2(x)))$

$= \cos(x\cdot\tan(x))(\tan(x) + x\cdot\sec^2(x))$