

## Fysiikan matematiikka: Harjoitus 2

1.  $x = \ln(y + \sqrt{y^2 + 1})$
2. a)  $\arcsin(0) = n\pi$   
b)  $\arcsin(1) = \frac{\pi}{2} + 2\pi n$   
c)  $\arcsin(\frac{1}{2}) = \frac{\pi}{6} + 2\pi n$   
tai  $\arcsin(\frac{1}{2}) = \frac{5\pi}{6} + 2\pi n$   
d)  $\arcsin(\frac{\sqrt{3}}{2}) = \frac{\pi}{3} + 2\pi n$   
tai  $\arcsin(\frac{\sqrt{3}}{2}) = \frac{2\pi}{3} + 2\pi n$   
e)  $\arctan(1) = \frac{\pi}{4} + \pi n$   
f)  $\arctan(\infty) = \frac{\pi}{2} + \pi n$
3. a)  $f(f(x)) = \frac{x}{\sqrt{1-2x^2}}$  ja  $f(f(f(x))) = \frac{x}{\sqrt{1-3x^2}}$   
b)  $d(a-1) = b(c-1)$
4.  $x = \pm 1$
5. a)  $y' = -4(3-x)^3$ ,  $y'' = 12(3-x)^2$ ,  
 $y''' = -24(3-x)$   
b)  $y' = \frac{2}{(x+1)^2}$ ,  $y'' = \frac{-4}{(x+1)^3}$ ,  
 $y''' = \frac{12}{(x+1)^4}$   
c)  $y' = 2x \cos(x^2)$ ,  $y'' = 2 \cos(x^2) - 4x^2 \sin(x^2)$ ,  
 $y''' = -12x \sin(x^2) - 8x^3 \cos(x^2)$   
d)  $y' = \frac{\cos x}{x} - \frac{\sin x}{x^2}$ ,  
 $y'' = -\frac{\sin x}{x} - \frac{2 \cos x}{x^2} + \frac{2 \sin x}{x^3}$ ,  
 $y''' = -\frac{\cos x}{x} + \frac{3 \sin x}{x^2} + \frac{6 \cos x}{x^3} - \frac{6 \sin x}{x^4}$
6.  $f^{(k)}(x) = (-1)^k k!$