Exercise 17. Differentiation of logarithmic functions

In Problems 1 to 6, use logarithmic differenti-ation to differentiate the given functions with respect to the variable.

1. $y = \dfrac{(x-2)(x+1)}{(x-1)(x+3)}$

2. $y = \dfrac{(x+1)(2x+1)^3}{(x-3)^2(x+2)^4}$

3. $y = \dfrac{(2x-1)\sqrt{(x+2)}}{(x-3)\sqrt{(x+1)^3}}$

4. $y = \dfrac{e^{2x}\cos 3x}{\sqrt{(x-4)}}$

5. $y = 3\theta \sin\theta \cos\theta$

Exercise 18. Differentiating $[f(x)]^x$ type functions

In Problems 1 to 4, differentiate with respect to x

1. $y = x^{2x}$

2. $y = (2x - 1)^x$

3. $y = \sqrt[x]{(x + 3)}$

4. $y = 3x^{4x+1}$

5. Show that when $y = 2x^x$ and $x = 1$, $\dfrac{dy}{dx} = 2$.

6. Evaluate $\dfrac{d}{dx}\left\{\sqrt[x]{(x - 2)}\right\}$ when $x = 3$.