ALA BLATTNR. **ABGABEDATUM**

Jonathan Siems, 6533519, Gruppe 12
Tronje Krabbe, 6435002, Gruppe 9

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1. **TODO**

2. **TODO**

3. a)

Umformen:
$$f(x) \; = \; (x \; + \; 1)^{x+2} \; = \; e^{ln(x+1)^{x+2}} \; = \; e^{ln(x+1)(x+2)}$$

Differenzieren:
$$f'(x) \; = \; \left(e^{ln(x+1)(x+2)} \right)'$$
$$= e^{ln(x+1)(x+2)} \cdot ((x+2) \cdot ln(x+1))'$$
$$= e^{ln(x+1)(x+2)} \cdot \left(x \cdot ln(x+1) \; + \; (x+2) \cdot \frac{1}{(x+1)} \right)$$
$$= (x \; + \; 1)^{x+2} \cdot \left(x \cdot ln(x+1) \; + \; \frac{x+2}{(x+1)} \right)$$

b) (i)

Umformen:
$$g(x) \; = \; (x^2+5)^{x^4+3} = e^{ln(x^2+5)^{x^4+3}} = e^{(x^4+3)\cdot ln(x^2+5)}$$

Differenzieren:
$$g'(x) = \left(e^{(x^4+3)\cdot ln(x^2+5)} \right)'$$
$$= e^{(x^4+3)\cdot ln(x^2+5)} \cdot \left((x^4+3) \cdot ln(x^2+5) \right)$$
$$= e^{(x^4+3)\cdot ln(x^2+5)} \cdot \left(4x^3 \cdot ln(x^2+5) + (x^4+3) \cdot \frac{2x}{x^2+5} \right)$$
$$= (x^2+5)^{x^4+3} \cdot \left(4x^3 \cdot ln(x^2+5) + \frac{2x^5+6x}{x^2+5} \right)$$

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(ii)

Umformen:
$$h(x) = (x^4 + 3)^{\sqrt{3x+1}} = e^{ln(x^4+3)^{\sqrt{3x+1}}} = e^{\sqrt{3x+1} \cdot ln(x^4+3)}$$

Differenzieren:
$$h'(x) = e^{\sqrt{3x+1} \cdot ln(x^4+3)} \cdot \left(\sqrt{3x+1} \cdot ln(x^4+3) \right)$$
$$= e^{\sqrt{3x+1} \cdot ln(x^4+3)} \cdot \left((\sqrt{3x+1})' \cdot ln(x^4+3) + \sqrt{3x+1} \cdot \frac{4x^3}{x^4+3} \right)$$
$$= (x^4+3)^{\sqrt{3x+1}} \cdot \left((\sqrt{3x+1})' \cdot ln(x^4+3) + \frac{4x^3 \sqrt{3x+1}}{x^4+3} \right)$$

c) **TODO**

4. **TODO**

5. **TODO**

6. **TODO**