

Übungsaufgaben M 2

Bilde die 1. Ableitungsfunktion $x \rightarrow y'$ der Funktion $x \rightarrow y$.

- 1) a) $y = (4x+3)(2x+1)$ b) $y = (x^3 - 3)(2x^5 + 1)$ c) $y = x^5(4x^3 + 5)$
 d) $y = (3x - 8)(x^4 - 3x^2 + 2)$ e) $y = x^3(3x^2 - 4x + 5)$ f) $y = (4x - 3)(5x^4 + 3x - 2)$
- 2) a) $y = x\sqrt{x+3}$ b) $y = (x-3)\sqrt{x}$ c) $y = (x^2 - 1)\sqrt{x^2 + 4}$
- 3) a) $y = 3x \cdot \cos x$ b) $y = 2x \cdot \tan x$ c) $y = \sin^2 x$
- 4) a) $y = \frac{4x+1}{x}$ b) $y = \frac{x}{4x+1}$ c) $y = \frac{x^3 - 1}{2x^2}$
 d) $y = \frac{x^3}{x^2 - 4}$ e) $y = \frac{2x^2 - 3}{x^3}$ f) $y = \frac{3x^3 + 1}{3x^3 - 1}$
 g) $y = \frac{a}{x+a}$ h) $y = \frac{a-x}{ax^2}$ i) $y = \frac{2x-p}{p-4x}$
- 5) a) $y = \frac{1}{\sqrt{2x-1}}$ b) $y = \sqrt{\frac{x}{x-2}}$ c) $y = \frac{x+1}{\sqrt{x-1}}$
 d) $y = \frac{\sqrt{2x}}{x+2}$ e) $y = \frac{x}{1+\sqrt{x}}$ f) $y = \frac{\sqrt{x}-1}{\sqrt{x}-1}$
- 6) a) $y = \frac{\sin x}{x}$ b) $y = \frac{x}{\cos x}$ c) $y = \frac{\tan x}{x^2}$
- 7) a) $y = (2x-1)^4$ b) $y = (x^2+3)^5$ c) $y = (4x^3+7)^6$
 d) $y = (3x^2 - 6x+1)^4$ e) $y = (3x^4 - x^2 - 4)^3$ f) $y = (x^3 - 5x^2 + 2x + 7)^5$
- 8) a) $y = \sqrt{3x^2 - 1}$ b) $y = \sqrt{7-4x}$ c) $y = \sqrt{x(4x+3)}$
- 9) a) $y = \sin 2x$ b) $y = \sin^2 x$ c) $y = \sin x^2$
 d) $y = \cos 3x$ e) $y = \tan^3 x$ f) $y = \sqrt{\cos x}$
- 10) a) $y = x(x-7)^7$ b) $y = 2x(3x+4)^5$ c) $y = (x+1)(2x-1)^4$
 d) $y = (x^2-4)(x^2-9)^2$ e) $y = (5x+2)(x^3-1)^4$ f) $y = (x^4-4)(2x^4+7)^3$
- 11) a) $y = ax(x^2+a)$ b) $y = (ux+v)(ux^3-v)$ c) $y = (ax^2-b)^4$
 d) $y = (x^4+px^2+q)^2$ e) $y = (ax+b)(cx^2+d)$ f) $y = px^3(x^2-p)^5$
- 12) Bilde die 1. Ableitung von $x \rightarrow y$ und vereinfache danach das Ergebnis.
 a) $y = \sin x \cdot \cos x + x$ b) $y = 2x - \sin 2x$ c) $y = 3\sin^2 x - \cos^2 x$

- 13) Bestimme a und b so, dass die Funktion $x \rightarrow y$ in der ganzen Definitionsmenge differenzierbar ist.

$$a) f(x) = \begin{cases} (x^2 - 2)^3 & \text{für } x \leq 1 \\ \frac{ax+b}{x} & \text{für } x > 1 \end{cases}$$

$$c) f(x) = \begin{cases} \sqrt{4x-3} & \text{für } x > 1 \\ \frac{ax}{bx+2} & \text{für } x \leq 1 \end{cases}$$

$$b) f(x) = \begin{cases} \frac{x+a}{ax} & \text{für } x \leq -1 \\ \frac{bx}{x+2a} & \text{für } x > -1 \end{cases}$$

$$d) f(x) = \begin{cases} a \cdot \sin x & \text{für } x < \frac{\pi}{6} \\ 6 \cdot \cos 2x + b & \text{für } x \geq \frac{\pi}{6} \end{cases}$$

- 14) a) $f(x) = (1 - 2x)(3x + 1)$ b) $f(x) = (x^2 - 4)(x^3 + 1)$ c) $f(x) = (\frac{1}{2}x - 1)(4 - 0,8x^2)$
 d) $f(t) = (3t^2 + t)(1 - t^2)$ e) $g(x) = (x^3 + x^2)(1 - x)$ f) $h(r) = (1 + r^2)^2$
- 15) a) $f(x) = x\sqrt{x}$ b) $f(x) = x^2\sqrt{x}$ c) $f(x) = (2x - 1)\sqrt{x}$
 d) $g(t) = (4t^2 - 1)\sqrt{t}$ e) $g(a) = \sqrt{a}(1 - a)$ f) $h(z) = \sqrt{z}(z^2 - 1)$
- 16) a) $f(x) = (2x + 1) \cdot \frac{1}{x}$ b) $f(x) = \frac{1}{x} \cdot (1 - x^3)$ c) $f(x) = \frac{3 - x}{x}$
- 17) a) $f(x) = x \cdot \cos x$ b) $f(x) = (x^2 + 1)\sin x$ c) $f(x) = \sqrt{x} \cdot \cos x$
 d) $g(t) = \sin t \cdot \cos t$ e) $g(t) = \sin^2 t$ f) $g(t) = \cos^2 t$
- 18) a) $f(x) = \frac{2x}{1 + 3x}$ b) $f(x) = \frac{3 - x}{x^2 + 1}$ c) $f(x) = \frac{x^2}{1 + 3x^2}$ d) $f(x) = \frac{x^3 + x}{x^2 - 1}$
- 19) a) $f(x) = \frac{a - bx}{a + bx}$ b) $f(x) = \frac{ax^2 + bx + c}{ax^2 - bx + c}$ c) $g(t) = \frac{ct^2 - d}{ct + d}$ d) $g(x) = \frac{x^{-3}}{x^{-3} - 1}$
- 20) a) $f(x) = \frac{1}{\sin x}$ b) $f(x) = \frac{\sin x}{x}$ c) $f(x) = \frac{x^2}{\cos x}$ d) $f(x) = \frac{\sin x}{\cos x}$
- 21) a) $f(x) = \frac{\sqrt{x}}{x + 1}$ b) $f(x) = \frac{1}{\sqrt{x + 1}}$ c) $f(x) = \frac{\sqrt{x + 1}}{\sqrt{x - 1}}$ d) $g(x) = \frac{\sqrt{x + 1}}{\sqrt{x - 1}}$
- 22) Schreibe den Quotienten zunächst als Summe, leite danach ab.
 a) $f(x) = \frac{x^3 + x}{x}$ b) $f(x) = \frac{3x^3 - x^2}{2x^2}$ c) $g(x) = \frac{3x^2 + x - 5}{4x}$ d) $f(x) = \frac{1 + x}{x^2}$
- 23) a) $f(x) = \frac{1}{1 + x} - \frac{1}{1 - x}$ b) $f(x) = \frac{1}{4x^2} - \frac{1}{2x^2 - 1}$ c) $s(t) = \frac{t}{a^2 - t^2} - \frac{a^2 - t^2}{t}$ d) $f(u) = \frac{1}{u^2} - \frac{1}{u^2 - 1}$
- 24) Leite zweimal ab:
 a) $f(x) = \frac{3}{x^2}$ b) $f(x) = \frac{2x + 1}{x^2}$ c) $f(x) = \frac{x^2 - x}{x + 1}$ d) $f(x) = \frac{x^3}{1 + x^3}$
 e) $f(x) = \frac{1}{\cos x}$ f) $f(x) = \frac{\cos x}{x}$ g) $f(x) = \frac{\cos x}{\sqrt{x}}$ h) $f(x) = \frac{\cos x}{\sin x}$
- 25) Gib $u(x)$ und $v(x)$ an, so daß $f(x) = u(v(x))$ ist.
 a) $f(x) = (x + 1)^2$ b) $f(x) = \sqrt{2x}$ c) $f(x) = \sqrt{|x|}$ d) $f(x) = \sin(2x + 1)$
 e) $f(x) = \frac{1}{x + 1}$ f) $f(x) = \frac{2}{\sqrt{x}}$ g) $f(x) = \frac{1}{x^n}$ h) $f(x) = \frac{4}{\cos x}$
- 26) a) $f(x) = (1 + 2x)^2$ b) $f(x) = (3 - x)^3$ c) $f(x) = (x + x^2)^2$ d) $f(x) = (1 + x^3)^4$
 e) $g(x) = (x^3 - 2x)^4$ f) $g(x) = (5x + x^2)^3$ g) $f(t) = (t^3 - 4t^2)^2$ h) $g(t) = (a^3 - t^3)^4$
 i) $f(x) = (2 - 3x + x^2)^3$ j) $h(x) = (1 - x + \frac{1}{2}x^3)^2$ k) $f(a) = (-\frac{1}{2}a^2 + a\sqrt{2})^4$ l) $f(x) = (x\sqrt{2} - x^2)^3$
- 27) a) $f(x) = \sqrt{3x}$ b) $f(x) = \sqrt{5x}$ c) $f(t) = \sqrt{at}$ d) $h(r) = \sqrt{a^2r}$
 e) $f(x) = \sqrt{1 + 2x}$ f) $g(x) = \sqrt{1 - x^2}$ g) $h(x) = \sqrt{x + x^2}$ h) $f(t) = \sqrt{t + t^3 + 1}$
 i) $f(x) = \sqrt{x^2 + 5x^3}$ j) $g(x) = \sqrt{2x - 6x^4}$ k) $h(t) = \sqrt{1 - t + t^2}$ l) $f(r) = \sqrt{r^3 - 1}$
- 28) a) $f(x) = \sin 2x$ b) $f(x) = \cos \frac{\pi}{2}x$ c) $f(x) = \sin(\frac{1}{2}x + \frac{\pi}{2})$ d) $s(t) = \cos(1 - t)$
 e) $f(x) = \sin x^2$ f) $g(t) = \cos \frac{\pi}{2}t^2$ g) $s(t) = 3 \sin(1 - \frac{1}{2}t^2)$ h) $f(t) = \frac{1}{2} \sin \sqrt{2}t^2$
- 29) a) $f(x) = (1 + \sqrt{x})^2$ b) $f(x) = (2\sqrt{x} - x)^3$ c) $f(x) = 2(x^2 - 3\sqrt{x})^2$ d) $g(t) = (t^3 - \sqrt{t})^{-2}$
 e) $f(x) = (\sin x)^2$ f) $a(x) = (\cos x)^3$ a) $h(x) = 2\sin^3 x$ h) $f(x) = \frac{1}{2} \cos^4 x$
- 30) a) $f(x) = \frac{(2x + 1)^2}{3x - 5}$ b) $f(x) = \frac{1 + 2x}{(2 - x)^2}$ c) $f(x) = \frac{(1 - 2x)^2}{(3 + 5x)^2}$
 d) $f(x) = \left(\frac{3x + 2}{4x - 2}\right)^2$ e) $f(x) = \left(\frac{1 - 2x}{2 - x}\right)^2$ f) $f(x) = \frac{x}{\sqrt{1 + 2x}}$
 g) $h(x) = \frac{\sqrt{1 + 2x^2}}{3x}$ h) $g(x) = \frac{\sqrt{2 + 3x}}{\sqrt{2 - 3x}}$ i) $f(t) = \frac{(2t + 1)^2}{\sqrt{1 - t}}$

Übungsaufgaben M 2 Lösungen

1a) $y' = 16x + 10$

c) $y' = 32x^7 + 25x^4$

e) $y' = 15x^4 - 16x^3 + 15x^2$

b) $y' = 16x^7 - 30x^4 + 3x^2$

d) $y' = 15x^4 - 32x^3 - 27x^2 + 48x + 6$

f) $y' = 100x^4 - 60x^3 + 24x - 17$

2a) $y' = \frac{3(x+2)}{2\sqrt{x+3}}$

b) $y' = \frac{3(x-1)}{2\sqrt{x}}$

c) $y' = \frac{3x^3 + 7x}{\sqrt{x^2 + 4}}$

3a) $y' = 3(\cos x - x \cdot \sin x)$

b) $y' = 2(x \cdot \tan^2 x + \tan x + x)$

c) $y' = 2 \sin x \cdot \cos x$

4a) $y' = -\frac{1}{x^2}$

b) $y' = \frac{1}{(4x+1)^2}$

c) $y' = \frac{x^3 + 2}{2x^3}$

d) $y' = \frac{x^4 - 12x^2}{(x^2 - 4)^2}$

e) $y' = \frac{-2x^2 + 9}{x^4}$

f) $y' = \frac{-18x^2}{(3x^3 - 1)^2}$

g) $y' = -\frac{a}{(x+a)^2}$

h) $y' = \frac{x - 2a}{ax^3}$

i) $y' = -\frac{2p}{(p - 4x)^2}$

5a) $y' = -\frac{1}{(2x-1)\sqrt{2x-1}}$

b) $y' = -\frac{1}{(x-2)\sqrt{x(x-2)}}$

c) $y' = \frac{x-3}{2(x-1)\sqrt{x-1}}$

d) $y' = \frac{-x+2}{(x+2)^2\sqrt{2x}}$

e) $y' = \frac{2+\sqrt{x}}{2(1+\sqrt{x})^2}$

f) $y' = \frac{\sqrt{x}-1}{2(x-1)\sqrt{x(x-1)}}$

6a) $y' = \frac{x \cdot \cos x - \sin x}{x^2}$

b) $y' = \frac{x \cdot \sin x + \cos x}{\cos^2 x}$

c) $y' = \frac{x \cdot \tan^2 x - 2 \tan x + x}{x^3}$

7a) $y' = 8(2x-1)^3$

b) $y' = 10x(x^2+3)^4$

c) $y' = 72x^2(4x^3+7)^5$

d) $y' = 24(x-1)(3x^2-6x+1)^3$

e) $y' = 6x(6x^2-1)(3x^4-x^2-4)^2$

f) $y' = 5(3x^2-10x+2)(x^3-5x^2+2x+7)^4$

8a) $y' = \frac{3x}{\sqrt{3x^2-1}}$

b) $y' = \frac{-2}{\sqrt{7-4x}}$

c) $y' = \frac{8x+3}{2\sqrt{x(4x+3)}}$

9a) $y' = 2 \cos 2x$

b) $y' = 2 \sin x \cdot \cos x$

c) $y' = 2x \cdot \cos x^2$

d) $y' = -3 \sin 3x$

e) $y' = \frac{3 \tan^2 x}{\cos^2 x}$

f) $y' = \frac{-\sin x}{2\sqrt{\cos x}}$

10a) $y' = (8x-7)(x-7)^6$

b) $y' = 4(9x+2)(3x+4)^4$

c) $y' = (10x+7)(2x-1)^3$

d) $y' = 2x(x^2-9)(3x^2-17)$

e) $y' = (65x^3+24x^2-5)(x^3-1)^3$

f) $y' = 4x^3(8x^4-17)(2x^4+7)^2$

11a) $y' = 3ax^2 + a^2$

b) $y' = 4u^2x^3 + 3uvx^2 - uv$

c) $y' = 8ax(ax^2 - b)^3$

d) $y' = 4x(2x^2+p)(x^4+px^2+q)$

e) $y' = 3acx^2 + 2bcx + ad$

f) $y' = px^2(13x^2-3p)(x^2-p)^4$

12a) $y' = 2 \cos^2 x$

b) $y' = 4 \sin^2 x$

c) $y' = 4 \sin 2x$

13a) $a = 5, b = -6$

b) $a = \frac{3}{4}; b = -\frac{1}{6}$

c) $a = 1, b = -1$

d) $a = -12, b = -9$

14) a) $-12x + 1$

b) $5x^4 - 12x^2 + 2x$

18) a) $f'(x) = \frac{2}{(1+3x)^2}$

b) $f'(x) = \frac{x^2 - 6x - 1}{(x^2 + 1)^2}$

c) $-1, 2x^2 + 1, 6x + 2$

d) $-12t^3 - 3t^2 + 6t + 1$

c) $f'(x) = \frac{2x}{(1+3x^2)^2}$

d) $f'(x) = \frac{x^4 - 4x^2 - 1}{(x^2 - 1)^2}$

e) $-4x^3 + 2x$

f) $4r(1+r^2)$

15) a) $\frac{3}{2}\sqrt{x}$

b) $\frac{5}{2}x\sqrt{x}$

19) a) $f'(x) = \frac{-2ab}{(a+bx)^2}$

b) $f'(x) = \frac{-2b(ax^2 - c)}{(ax^2 - bx + c)^2}$

c) $3\sqrt{x} - \frac{1}{2\sqrt{x}} = \frac{6x-1}{2\sqrt{x}}$

d) $10t\sqrt{t} - \frac{1}{2\sqrt{t}} = \frac{20t^2-1}{2\sqrt{t}}$

c) $g'(t) = \frac{c^2t^2 + 2cdt + cd}{(ct+d)^2}$

d) $g'(x) = \frac{3x^{-4}}{(x^{-3}-1)^2} = \frac{3x^2}{(1-x^3)^2}$

e) $\frac{1}{2\sqrt{a}} - \frac{3}{2}\sqrt{a} = \frac{1-3a}{2\sqrt{a}}$

f) $\frac{5}{2}z\sqrt{z} - \frac{1}{2\sqrt{z}} = \frac{5z^2-1}{2\sqrt{z}}$

20) a) $f'(x) = -\frac{\cos x}{\sin^2 x}$

b) $f'(x) = \frac{x \cdot \cos x - \sin x}{x^2}$

16) a) $-\frac{1}{x^2}$

b) $-\frac{1}{x^2} - 2x = -\frac{1+2x^3}{x^2}$

c) $-\frac{3}{x^2}$

c) $f'(x) = \frac{2x \cos x + x^2 \sin x}{\cos^2 x}$

d) $f(x) = \tan x, f'(x) = \frac{\cos^2 x + \sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$

17) a) $\cos x - x \cdot \sin x$

b) $2x \cdot \sin x + (x^2 + 1) \cos x$

c) $\frac{1}{2\sqrt{x}} \cos x - \sqrt{x} \cdot \sin x = \frac{\cos x - 2x \cdot \sin x}{2\sqrt{x}}$

d) $\cos^2 t - \sin^2 t = \cos 2t$

e) $2 \sin t \cdot \cos t = \sin 2t$

f) $-2 \cos t \cdot \sin t = -\sin 2t$

21) a) $f'(x) = \frac{1-x}{2 \cdot \sqrt{x(x+1)^2}}$

b) $f'(x) = \frac{-1}{2 \cdot \sqrt{(x+1)^3}}$

c) $f'(x) = -\frac{1}{\sqrt{x}(\sqrt{x}-1)^2}$

d) $g'(x) = \frac{-1}{\sqrt{x+1}\sqrt{(x-1)^3}}$

22) a) $f'(x) = 2x$ b) $f'(x) = \frac{3}{2}$
 c) $g'(x) = \frac{3}{4} + \frac{5}{4x^2}$ d) $f'(x) = -\frac{2}{x^3} - \frac{1}{x^2}$

23) a) $f'(x) = -\frac{1}{(1+x)^2} - \frac{1}{(1-x)^2} = -2 \frac{1+x^2}{(1-x^2)^2}$
 b) $f'(x) = -\frac{1}{2x^3} + \frac{4x}{(2x^2-1)^2}$ 25) a) $u(x) = x^2$; $v(x) = x+1$ b) $u(x) = \sqrt{x}$; $v(x) = 2x$
 c) $s'(t) = \frac{a^2+t^2}{(a^2-t^2)^2} + \frac{a^2}{t^2} + 1$ c) $u(x) = \sqrt{x}$; $v(x) = |x|$ d) $u(x) = \sin x$; $v(x) = 2x+1$
 d) $f'(u) = \frac{2u}{(u^2-1)^2} - \frac{2}{u^3}$ e) $u(x) = \frac{1}{x}$; $v(x) = x+1$ f) $u(x) = \frac{2}{x}$; $v(x) = \sqrt{x}$
 g) $u(x) = \frac{1}{x}$; $v(x) = x^n$ h) $u(x) = \frac{4}{x}$; $v(x) = \cos x$

24) a) $f'(x) = \frac{-6}{x^3}$; $f''(x) = \frac{18}{x^4}$
 b) $f'(x) = -\frac{2}{x^2} - \frac{2}{x^3}$; $f''(x) = \frac{4}{x^3} + \frac{6}{x^4}$
 c) $f'(x) = \frac{x^2+2x-1}{(x+1)^2}$; $f''(x) = \frac{4}{(x+1)^3}$
 d) $f'(x) = \frac{3x^2}{(1+x^3)^2}$; $f''(x) = \frac{6x(1-2x^3)}{(1+x^3)^3}$
 e) $f'(x) = \frac{\sin x}{\cos^2 x}$; $f''(x) = \frac{\cos^2 x + 2 \sin^2 x}{\cos^3 x}$
 f) $f'(x) = -\frac{x \sin x + \cos x}{x^2}$; $f''(x) = -\frac{1}{x^3}(x^2 \cos x - 2x \sin x - 2 \cos x)$
 g) $f'(x) = \frac{-2x \sin x - \cos x}{2x\sqrt{x}}$; $f''(x) = \frac{-\sqrt{x}}{4x^3}(-4x \sin x + 4x^2 \cos x - 3 \cos x)$
 h) $f'(x) = -\frac{1}{\sin^2 x}$; $f''(x) = \frac{2 \cos x}{\sin^3 x}$

26) a) $f'(x) = 4 + 8x$ b) $f'(x) = -3(3-x)^2$
 c) $f'(x) = 2x + 6x^2 + 4x^3$ d) $f'(x) = 12x^2(1+x^3)^3$
 e) $g'(x) = (12x^2 - 8)(x^3 - 2x)^3$ f) $g'(x) = (6x + 15)(5x + x^2)^2$
 g) $f'(t) = 64t^3 - 40t^4 + 6t^5$ h) $g'(t) = -12t^2(a^3 - t^3)^3$
 i) $f'(x) = (6x - 9)(2 - 3x + x^2)^2$
 j) $h'(x) = 2(-1 + \frac{3}{2}x^2)(1 - x + \frac{1}{2}x^3) = -2 + 2x + 3x^2 - 4x^3 + 1,5x^5$
 k) $f'(a) = 4(-a + \sqrt{2})(-\frac{1}{2}a^2 + \sqrt{2}a)^3$ l) $f'(x) = 3(\sqrt{2} - 2x) \cdot (\sqrt{2}x - x^2)^2$

27) a) $f'(x) = \frac{\sqrt{3}}{2\sqrt{x}}$ b) $f'(x) = \frac{\sqrt{5}}{2\sqrt{x}}$ 28) a) $f'(x) = 2 \cos 2x$ b) $f'(x) = -\frac{\pi}{2} \sin \frac{\pi}{2} x$
 c) $f'(t) = \frac{\sqrt{a}}{2\sqrt{t}}$ d) $h'(r) = \frac{|a|}{2\sqrt{r}}$ c) $f'(x) = \frac{1}{2} \cos \left(\frac{1}{2}x + \frac{\pi}{2} \right)$ d) $s'(t) = \sin(1-t)$
 e) $f'(x) = \frac{1}{\sqrt{1+2x}}$ f) $g'(x) = \frac{-x}{\sqrt{1-x^2}}$ e) $f'(x) = 2x \cdot \cos x^2$ f) $g'(t) = -\pi t \cdot \sin \frac{\pi}{2} t^2$
 g) $h'(x) = \frac{1+2x}{2\sqrt{x+x^2}}$ h) $f'(t) = \frac{1+3t^2}{2\sqrt{t+t^3+1}}$ g) $s'(t) = -3t \cdot \cos \left(1 - \frac{t^2}{2} \right)$ h) $f'(t) = \sqrt{2t} \cdot \cos \sqrt{2} t^2$
 i) $f'(x) = \frac{x + \frac{15}{2}x^2}{\sqrt{x^2+5x^3}}$ j) $g'(x) = \frac{x+12x^3}{\sqrt{2x-6x^4}}$
 k) $h'(t) = \frac{t - \frac{1}{2}}{\sqrt{1-t+t^2}}$ l) $f'(r) = \frac{3r^2}{2\sqrt{r^3-1}}$

29) a) $f'(x) = \frac{1+\sqrt{x}}{\sqrt{x}}$ b) $f'(x) = 3(2\sqrt{x} - x)^2 \cdot \left(\frac{1}{\sqrt{x}} - 1 \right)$ 30) a) $f'(x) = \frac{(2x+1)(6x-23)}{(3x-5)^2}$ b) $f'(x) = \frac{2(x+3)}{(2-x)^3}$
 c) $f'(x) = 4(x^2 - 3\sqrt{x}) \cdot \left(2x - \frac{3}{2\sqrt{x}} \right)$ d) $g'(t) = \frac{-6t^2 + \frac{1}{\sqrt{t}}}{(t^3 - \sqrt{t})^3}$ c) $f'(x) = \frac{22(2x-1)}{(3+5x)^3}$ d) $f'(x) = \frac{-28(3x+2)}{(4x-2)^3}$
 e) $f'(x) = 2 \sin x \cdot \cos x = \sin 2x$ f) $g'(x) = -3 \sin x \cdot \cos^2 x$ e) $f'(x) = \frac{6(2x-1)}{(2-x)^3}$ f) $f'(x) = \frac{1+x}{\sqrt{(1+2x)^3}}$
 g) $h'(x) = 6 \cdot \sin^2 x \cdot \cos x$ h) $f'(x) = -2 \sin x \cdot \cos^3 x$ g) $f'(x) = \frac{-1}{3x^2 \cdot \sqrt{1+2x^2}}$ h) $f'(x) = \frac{6}{\sqrt{2+3x} \cdot \sqrt{(2-3x)^3}}$
 i) $f'(x) = \frac{-12t^2 + 12t + 9}{2 \cdot \sqrt{(1-t)^3}}$