1. 2

2. 14

3. $\frac{3}{8}$

4. $\frac{7}{9}$

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

6. $f'(x) = 6x$

7. $f'(x) = 35x^6 + 18x^5 + 5\pi x^4 + 2ex$

8. $s'(t) = 16t^7 + 15t^4 - 32t^3 + 2t - 98$

9. $y' = 2x\sqrt{x^4-3} + \frac{2x^5}{\sqrt{x^4-3}}$

10. $y' = 20x^4\sqrt[3]{x^8+3x+1} + 4x^5\left(\frac{8x^7+3}{(x^8+3x+1)^{\frac{2}{3}}}\right)$

11. $g'(t) = \frac{(10t+2)(7t+9) - 7(5t^2+2t+1)}{(7t+9)^2}$

12. $h'(r) = \frac{5\sqrt{t^2+3t+2} - \frac{(5t+1)(2t+3)}{2\sqrt{t^2+3t+2}}}{t^2+3t+2}$

13. $p'(x) = 200(x^2+x^{-1})^{199}\left(2x - \frac{1}{x^2}\right)$

14. $q'(x) = \pi(x^2+x^5+x^{-9})^{\pi-1}(2x+5x^4-9x^{-10})$

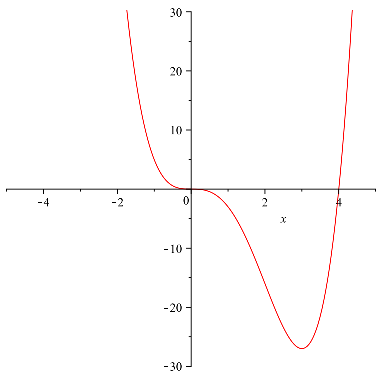
15. $\frac{dy}{dx} = \frac{y^3 - 6x^2 - 2xy}{x^2 - 3xy^2}$

16. $\frac{dy}{dx} = \frac{5x^4 + 4x^3y - 3y^2}{6xy - 3y^2 - x^4}$

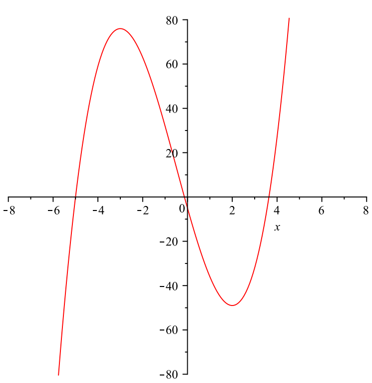
17. $y = 2$

18. $y = \left(2 + \frac{1}{2\sqrt{2}}\right)x - 2 - \frac{3\sqrt{2}}{4}$

19. The function has critical points at $(0,0)$ and $(3,-27)$. It has a local minimum at $(3,-27)$. It has inflection points at $(0,0)$ and $(2,-16)$. It is increasing on $(3,\infty)$ and decreasing on $(-\infty,3)$. It is concave up on $(-\infty,0)\cup(2,\infty)$ and concave down on $(0,2)$.



20. The function has critical points at $(-3,62)$ and $(2,-69)$. It has a local maximum at $(-3,62)$ and a local minimum at $(3,-69)$. It has an inflection point at $\left(-\frac{1}{2},\frac{27}{2}\right)$. It is increasing on $(-\infty,-3)\cup(2,\infty)$ and decreasing on $(-3,2)$. It is concave down on $\left(-\infty,-\frac{1}{2}\right)$ and concave up on $\left(-\frac{1}{2},\infty\right)$.



21. $8\cdot7\cdot6\cdot5\cdot4\cdot3\cdot2\cdot1=8!$

22. $10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 10!$