1. $\dfrac{dy}{dt} = 6$
2. $f'(t) = 100t^9$
3. $f'(x) = 9(x^2 - 1)$
4. $\dfrac{dy}{dt} = 9t^2 - 24t + 23$
5. $f'(t) = 18t^8 + 45t^{-10} + 9$
6. $z' = -12y^{-7} + 16y^{-5} - 16y^{-3}$
7. $\dfrac{dy}{dx} = \dfrac{1}{\sqrt{x}} + \dfrac{1}{\sqrt[3]{x^2}} - \dfrac{1}{\sqrt[4]{x^3}}$
8. $f'(x) = \dfrac{6}{5x^{2/5}} - 7x^{3/4} + 8x^{5/3}$
9. $f'(t) = -t^{-2} + 3t^{-4} - 5t^{-6}$
10. $g'(z) = \dfrac{-1}{z^4}\left(6 + \dfrac{5}{z^2} - \dfrac{42}{z^4}\right)$
11. $\dfrac{dy}{dx} = x(20x^2 - 4)$
12. $\dfrac{dy}{dt} = 12t^2 - 9$
13. $f'(x) = 4\left(4x - \dfrac{1}{x^2}\right)$
14. $r'(t) = 10t - 8t^{-3}$
15. $v(t)$ is not changing at $t = -5$ and at $t = 3$
16. $r(t)$ is not changing at $t = 0$, $t = \frac{8+\sqrt{364}}{10} = 2.708$ and at $t = \frac{8-\sqrt{364}}{10} = -1.1086$
17. The zeroes of the derivative are at $x = -2$, $x = 0$ and $x = 3$. It is decreasing over $-2 < x < 3$ and increasing everywhere else
18. The zeroes of the derivative are at $x = -5/3$ and $x = 1$. It is increasing over $-5/3 < x < 1$ and decreasing everywhere else
19. The tangent to $f(x)$ will be parallel to $y = 2x + \frac{1}{2}$ at $x = 1$
20. The tangent will be parallel to $\omega = 9 - t/2$ at $t = \pm 3\sqrt{2}$