1) $y = x^5$
$y' = 5x^4$

2) $f(x) = 4x^3$
$f'(x) = 12x^2$

3) $f(x) = 3x^2 - 4x + 1$
$f'(x) = 6x - 4$

4) $y = 5x - 1$
$\frac{dy}{dx} = 5$

5) $f(t) = -2t^2 + 3t - 6$
$f'(t) = -4t + 3$

6) $f(x) = \frac{1}{x^7}$
$f(x) = x^{-7}$
$f'(x) = -7x^{-8} = \frac{-7}{x^8}$

7) $f(x) = 2x^{-1} + 5x^2$
$f'(x) = -2x^{-2} + 10x$

8) $f(x) = \sqrt[4]{x} = x^{1/4}$
$f'(x) = \frac{1}{4}x^{-3/4} = \frac{1}{4\sqrt[4]{x^3}}$

9) $y = \sqrt[3]{x^2} = x^{2/3}$
$\frac{dy}{dx} = \frac{2}{3}x^{-1/3}$
$\frac{dy}{dx} = \frac{2}{3\sqrt[3]{x}}$

10) $y = \frac{1}{3}x^{-3}$
$\frac{dy}{dx} = -x^{-4}$
$\frac{dy}{dx}\Big|_{x=1} = -1$

11) $f(x) = 8$
$f'(x) = 0$
$f'(1) = 0$

12) $y = 4x^{-2} - 8x + 1$
$y' = -8x^{-3} - 8$
$y'(1) = -8 - 8 = -16$

13) $f(x) = \frac{x^{-4}}{4} - \frac{x^{-3}}{3} + \frac{x^{-2}}{2} - x^{-1} + 3$
$f(x) = \frac{1}{4}x^{-4} - \frac{1}{3}x^{-3} + \frac{1}{2}x^{-2} - x^{-1} + 3$
$f'(x) = -x^{-5} + x^{-4} - x^{-3} + x^{-2}$
$f'(1) = -1 + 1 - 1 + 1 = 0$

14) $y = 2\sqrt{x} - \frac{1}{\sqrt{x}}$
$y = 2x^{1/2} - x^{-1/2}$
$y' = x^{-1/2} + \frac{1}{2}x^{-3/2}$
$y'\Big|_{x=1} = 1 + \frac{1}{2} = \frac{3}{2}$

15) $f(x) = x^{4/5} + x^{2/3} - 3$
$f'(x) = \frac{4}{5}x^{-1/5} + \frac{2}{3}x^{-1/3}$
$f'(1) = \frac{4}{5} + \frac{2}{3} = \frac{22}{15}$

16) $y = x^4 - 3x^2 + 2$
$y' = 4x^3 - 6x$
$y'(2) = 20$

17) $f(x) = x^3 + x$
$f'(x) = 3x^2 + 1$
$f'(-1) = 4$

18) $f(x) = \dfrac{2}{\sqrt[4]{x^3}} = 2x^{-3/4}$
$f'(x) = -\dfrac{6}{4} x^{-7/4}$
$f'(1) = -\dfrac{6}{4}$

19) $y = (x^2 + 2x)(x+1)$

$y = x^3 + x^2 + 2x^2 + 2x$
$y = x^3 + 3x^2 + 2x$

$\dfrac{dy}{dx} = 3x^2 + 6x + 2$

$\dfrac{dy}{dx}\Big|_{x=0} = 2$

20) $\lim\limits_{\Delta x \to 0} \dfrac{(x+\Delta x)^2 - 5(x+\Delta x) + 6 - (x^2 - 5x + 6)}{\Delta x}$

$= \boxed{2x - 5}$

21) $f'(x) = x^2 + 2x + 8$
Answers will vary