Recall the following rules for differentiation:

$\frac{d}{dx}c = 0$ $\qquad$ $\frac{d}{dx}(x^n) = nx^{n-1}$

$\frac{d}{dx}(cf(x)) = cf'(x)$ $\qquad$ $\frac{d}{dx}(f(x) + g(x)) = f'(x) + g'(x)$

$\frac{d}{dx}(f(x) - g(x)) = f'(x) - g'(x)$ $\qquad$ $\frac{d}{dx}(f(x)g(x)) = f'(x)g(x) + f(x)g'(x)$

$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$ $\qquad$ $\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$

Use the rules of differentiation to compute the derivatives of the following functions with respect to the variable x.

1) $f(x) = \sqrt{30}$

2) $f(x) = -4x^{10}$

3) $f(x) = 5x^8 - 2x^5 + 6$

4) $f(x) = \frac{1}{2}x^6 - 3x^4 + x$

5) $f(x) = 5x^{-3/5}$

6) $f(x) = \frac{\sqrt{10}}{x^7}$

7) $f(x) = \sqrt{x} - \frac{1}{\sqrt{\cos(x)}}$

8) $f(x) = \left(x^{1/3} + \tan(x)\right)^3$

9) $f(x) = (x^{-2} + x^{-3})(x^5 - 2x^2)$

10) $f(x) = \frac{x^3 + x}{\sin^4(x) - 2}$

11) $f(x) = \sqrt{(x^2 + 1)}(x - 1)$

12) $f(x) = x^2 + x + x^{-1} + x^{-2}$

13) $f(x) = \frac{x^6 - 2x^3 + 5}{x^2}$

14) $f(x) = \frac{ax + b}{cx + d}$

15) $f(x) = \sin(1 + \cos^2(1 + x^2))$

1) $f'(x) = 0$

2) $f'(x) = -40x^9$

3) $f'(x) = 40x^7 - 10x^4$

4) $f'(x) = 3x^5 - 12x^3 + 1$

5) $f'(x) = -3x^{-8/5}$

6) $f'(x) = -\frac{7\sqrt{10}}{x^8}$

7) $f'(x) = \frac{1}{2}x^{-1/2} + \frac{1}{2}\left(\cos\left(x\right)\right)^{-3/2}\left(-\sin\left(x\right)\right)$

8) $f'(x) = 3\left(x^{1/3} + \tan\left(x\right)\right)^2\left(\frac{1}{3}x^{-2/3} + \sec^2\left(x\right)\right)$

9) $f'(x) = (-2x^{-3} - 3x^{-4})(x^5 - 2x^2) + (x^{-2} + x^{-3})(5x^4 - 4x)$

10) $f'(x) = \frac{\left(\sin^4\left(x\right)-2\right)\left(3x^2+1\right)-\left(x^3+x\right)\left(4\sin^3\left(x\right)\cos\left(x\right)\right)}{\left(\sin^4\left(x\right)-2\right)^2}$

11) $f'(x) = \frac{1}{2}\left(x^2+1\right)^{-1/2}(2x)(x-1) + \left(x^2+1\right)^{1/2}$

12) $f'(x) = 2x + 1 - x^{-2} - 2x^{-3}$

13) $f'(x) = \frac{x^2(6x^5-6x^2)-(x^6-2x^3+5)(2x)}{(x^2)^2}$

14) $f'(x) = \frac{(cx+d)(a)-(ax+b)(c)}{(cx+d)^2}$

15) $f'(x) = \cos\left(1+\cos^2\left(1+x^2\right)\right)\left(2\cos\left(1+x^2\right)\right)\left(-\sin\left(1+x^2\right)\right)(2x).$