Name: _____

Basic Differentiation Rules

Exercise 1: Use derivative rules to find the derivative of the function:

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

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

3) $g(x)=(x^2-2x+3)(x^4-4x^2+7x)$

4) $h(x)=(x^2-3x+7)^5$

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

6) $g(x)=\sqrt{x^2-3x}$

Exercise 2: Differentiate with respect to x

1) $f(x)=4x^2-6x+5$

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

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

4) $f(x)=7x^3-3x^2-31$

5) $f(x)=4x-\frac{1}{x}+5$

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

7) $f(x)=\left(2+\frac{1}{x}\right)^2$

8) $f(x)=\sqrt{x}+\frac{1}{\sqrt{x}}$

9) $f(x)=\frac{(x+1)\sqrt{x}}{x^2}$

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

11) $f(x)=\frac{2x+3}{x}$

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

Exercise 3: Find the following

1) $\frac{d}{dt}\left(3t^2-7t-2\right)$

2) $\frac{d}{du}\left[(u+1)(u+2)(u+3)\right]$

3) $\frac{d}{ds}\left(\frac{(s+1)(3-s^2)}{s}\right)$

4) $\frac{d}{df}\left(\frac{1}{f}-\frac{1}{f^2}\right)$

Exercise 4: Differentiate with respect to t

1) $f(t)=(t+1)(2t^2-1)$

2) $f(t)=(3t^3-1)(t^3+1)$

3) $f(t)=t\sqrt{t}+5+\frac{3}{t}$

4) $f(t)=(t+1)^3$

5) $f(t)=\frac{t^2+t+1}{t}$

6) $f(t)=\frac{t^2+2t+1}{t+1}$

Exercise 5: Let $f(x)=x^3$ and $f^{-1}(x)=\sqrt[3]{x}$. Show that the value of the derivative of *f* at *(2 , 8)* is the reciprocal of the value of the derivative of f^{-1} at *(8 , 2)*.