**Derivatives Practice** **Math 231 Fall 2013**

For each function $f(x)$ find $f'(x)$.

**1.** $f(x) = \sqrt{(3x^4 - 1)^3}$

**2.** $f(x) = \sqrt{(3x^4 - 1)^3 + x}$

**3.** $f(x) = \dfrac{\sqrt{1-x}}{x^2 - 4}$

**4.** $f(x) = \sqrt{x}(5x + 2)^{100}$

**5.** $f(x) = \sqrt{x(5x + 2)^{100}}$

**6.** $f(x) = (\sqrt{x}(5x + 2))^{100}$

**7.** $f(x) = \dfrac{x^5 + x\sqrt{x}}{x^2}$

**8.** $f(x) = \dfrac{1}{\sqrt{x}} + \dfrac{1}{x^2}$

**9.** $f(x) = \sqrt{\sqrt{x}}$

**10.** $f(x) = \dfrac{3}{x^{-\frac{3}{2}}\sqrt{x}}$

**11.** $f(x) = (3x + 1)^2(2x + 3)^8(5x - 2)^4$

**12.** $f(x) = \dfrac{(x-1)(x-2)}{(x-3)(x-4)}$

**13.** $f(x) = (x^2 - 17x)^{-9} \cdot \dfrac{x^2 + 1}{\sqrt{2x + 1}}$

**14.** $f(x) = (((x^2 + 1)^2 + 1)^2 + 1)^2$

**15.** $3x^2 + 4y^2 + xy = 0$ (find $\frac{dy}{dx}$)

**16.** $\dfrac{y^3 + 1}{x^3 + 1} = y^2$ (find $\frac{dy}{dx}$)

**17.** $\dfrac{1}{y} - \dfrac{1}{x} = \dfrac{x^3}{y - 1}$ (find $\frac{dy}{dx}$)

**18.** $A(t) = \pi(r(t))^2$ (find $\frac{dA}{dr}$ and $\frac{dA}{dt}$)

**19.** $f(x) = \dfrac{1}{x^2 + 1}$
(find $f'(x)$, $f''(x)$, and $f'''(x)$)

**20.** $f(x) = 10x^8 + 6x^5 - 4x^2 + 17$
(find $f'(x)$ and $f^{[8]}(x)$ and $f^{[9]}(x)$)