Exam 2

CALCULUS 151 Name: _____

Instructions: No calculators, no looking at other people's work, etc. Don't forget to read the directions to each problem. If a question is not clear, raise your hand and Kris will come and clarify it for you.

1. Take derivatives of the following functions:

$f(x) = \dfrac{x}{\sqrt{x}+3}$ $\qquad$ $g(x) = \frac{\sqrt{x}+3}{x}$

$h(x) = (x^{1/5} + \sqrt{x})(x^{1/5} - \sqrt{x})$ $\qquad$ $k(x) = \sqrt{(x^3+1)^4 + x(x^3+2)^{1/4}}$

2. Find the following anti-derivatives:

$\displaystyle\int x^{15}\, dx$ $\qquad$ $\displaystyle\int \sqrt{x+1}\, dx$

$\displaystyle\int x^3 + 2365ex^2 - \pi x + 19\, dx$ $\qquad$ $\displaystyle\int (4x-7)^{-1/4}\, dx$

3. The equation

$$2y^2x + 2yx^2 = 2 + x^2 + y^2$$

defines a curve which passes through the point $(1, 1)$.

Find $\frac{dy}{dx}$.

Give the equation of the tangent line to the curve at the point $(1, 1)$ in slope-intercept form.

4. In class, we proved that if n is a natural number (e.g. 1,2,3,...), then the derivative of x^n is nx^{n-1}. (The book calls this the Power Rule for Derivatives.) Use this rule and the technique of implicit differentiation to prove that if $y = x^{3/4}$, then $\frac{dy}{dx} = \frac{3}{4}x^{-1/4}$.

5. At home, Piper has a line to run along:

Let $s(t)$ represent Piper's position on the line at time t.

How is Piper's velocity related to $s(t)$?

What is happening if her velocity is negative?

How is Piper's acceleration related to $s(t)$?

How is Piper's acceleration related to her velocity?

What is happening if Piper's acceleration is negative? (Be careful to not confuse *velocity* with *speed*.)

6. Last week, I biked to school on both Thursday and Friday. Those two trips are represented graphically below, with Thursday on the left side of the page, and Friday on the right. Fill in the blank graphs. (You may assume that the road from my place to school is straight.)

Extra Credit: Name the last five men to hold the job of Vice President of the United States (including the current VP.)