Name _____ Date _____

<u>Instructions</u>: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. For $y = 3\cos(5(x - \frac{\pi}{2})) - 1$, answer the following questions.

    (a) (5 pts) What is the amplitude? _____

    (b) (5 pts) What is the period? _____

    (c) (5 pts) What is the vertical shift? _____ units

        up or down   (circle one)

    (d) (5 pts) What is the horizontal shift? _____ units

        left or right   (circle one)

    (e) (10 pts) Fill in the table with the y-values corresponding to the given x-values. (Note: I want <u>exact</u> values here, with your work shown...so don't just plug these in on your calculator and give me an approximation.)

x	y
$\frac{\pi}{2}$	
$\frac{\pi}{6}$	
$\frac{\pi}{4}$	
$\frac{11\pi}{15}$	

2. (15 pts) Find the limit, if it exists. (Show all work.)

$$\lim_{x\to 0} \frac{\cos(2x)\sin(4x)\csc(5x)}{\sec(3x)}$$

Answer 2: _____

3. (10 pts each) Find the indicated derivative of the given functions.

(a) $D_x\left(\tan(4x^2+5x-1)\cos^2(3x)\right)$ (Do **not** bother to simplify!)

Answer 3(a):_____

(Note: This is #3 continued!)

(b) $\dfrac{d}{dx}\left(\dfrac{x^4-3x^2+1}{x^3-\sqrt[4]{x}}\right)^5$ (Do **not** bother to simplify!)

Answer 3(b):_____

(c) $f'(1)$ if $f(x)=\left(2x-\dfrac{1}{x}\right)^3(4x^3-2)^4$

Answer 3(c): _____

(d) $\dfrac{dy}{dx}$ given $2x^4 y + y^3 = 2x^2 - 6x$

(Solve for $\dfrac{dy}{dx}$, i.e. get it by itself, but don't bother simplifying any further.)

Answer 3(d): _____

(e) $f'''(x)$ for $f(x) = (3x - 4)^{\frac{2}{5}}$

Answer 3(e): _____

4. (15 points) Choose either A or B to do. You CANNOT get credit for both and we will not choose for you, if you decide to try both of them.

Grade   A   or   B   *(circle one)*

   A.   A metal rod has the shape of a right circular cylinder. As it is being heated, its length is increasing at a rate of 0.005 cm/min and its radius is increasing at 0.001 cm/min. At what rate is the volume changing when the rod has length 40 cm and radius 1.5 cm?

   B. A softball diamond has the shape of a square with sides 40 ft. long. If a player is running from second base to third base at a speed of 20 ft/sec, at what rate is her distance from home plate changing when she is 30 ft from third base?

Answer 4A: _____ OR   Answer 4B:_____

(7 pts) :

Show that the tangent lines to the curves $y^2 = 4x^3$ and $2x^2 + 3y^2 = 14$ at (1, 2) are perpendicular to each other.