Pre-Calculus 12B

Test: Derivatives ***Name:_____***

November 2016

1. Given that $f(x)=\sqrt{5x-1}$ use the **definition of a derivative** to find $f'(2)$. [6]

(No other method will be accepted!)

2. Differentiate each of the following: [8]

(a) $f(x)=\tan(3x-5)^3-\sec^4 2x^5$

(b) $y=\dfrac{\cos^2 5x-\sin x^5}{\cot\sqrt{1-x^2}}$

3. Given that $f(x)=\frac{2}{\sqrt[3]{2-5x}}$, determine the value of $f''(2)$ [4]

4. Determine the equation of the tangent line drawn to the curve $x^2-2xy=x^2y-3x$ at the ordered pair $(-1,2)$. [5]

5. Find the ***x*-intercept** of the tangent line drawn to the curve $f(x)=\frac{1-3x^3}{\sqrt{x+5}}$ at the point where x = -1 . [6]

6. Find the points on the curve $y = \cos x - 2x$, $0 < x < 2\pi$, where a tangent to the curve would be perpendicular to the line $3y - 2x + 6 = 0$. [6]

7. A particle moves along a **vertical** line in such a way that at time *t* seconds after the start, the particle is located $s = 2t^3 - 21t^2 + 36t + 3$ metres from its starting position, where $t \geq 0$.

(a) What is the velocity of the particle when the acceleration is equal to 18 m/s^2 ? [4]

(b) Determine the acceleration of the particle the instant it changes direction for the **second** time. [4]

(c) What is the total **distance** traveled by the particle over the first 24 seconds. [4]