Name: ______________________________

MCV 4U1 - Practice Examination – Part 2: Calculus

Instructions to students:
1. Do not spend too much time on any one question.
2. Write all answers in simplest form.
3. Graphing calculators are permitted if you've been using one as your main calculator all semester.

② 1. Fill in the blank with two terms that mean the same as

Derivative = ______________________________ = ______________________________

⑨ 2. Evaluate each of the following limits, where possible:

① (a) $\lim_{x\to 0} \frac{\sqrt{x}-2}{x+5}$	② (b) $\lim_{x\to 2} \frac{x^2-16}{x^2-6x+8}$	② (c) $\lim_{x\to \infty} \frac{3x^2-2x+5}{2x^2-11}$

④ (d) $\lim_{x\to 0} \frac{\sqrt{x+4}-2}{x}$

④ 3. Differentiate $f(x)=\frac{2x}{x-3}$ using <u>first principles</u>:

4. Differentiate and simplify, where possible.

③ (a) $y = 4\sqrt{3x^2 + 6x - 1}$

③ (b) $f(x) = (x+2)(2x-5)^4$

③ (c) $g(x) = \dfrac{x^2 + x - 4}{4x - 1}$

③ (d) $f(x) = \cos(x^3 - x^2 + 4)$

③ (e) $y = 5x^3 \cdot e^{4x+1}$

④ (f) $f(x) = \ln(4x-5)^3$

④ 5. Find the **equation** of the tangent to the graph of $f(x)=\frac{e^x}{x^2}$ at the point where $x = 2$.

④ 6. Show that the tangent to the curve $y = x + 2x^2 - x^4$ at the point (-1, 0) is also tangent to the curve at (1, 2).

⑤ 7. (a) Determine the slope of the tangent to $h(x)=2x(x+1)^3(x^2+2x+1)^2$ at $x=-2$.

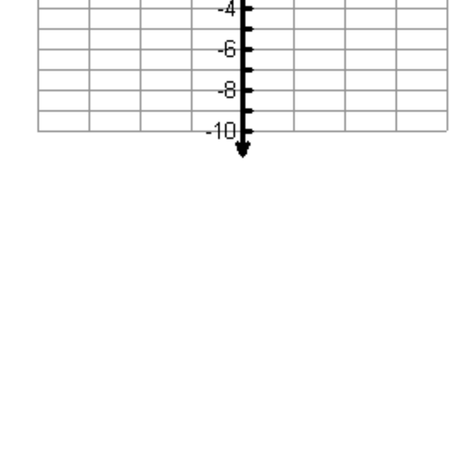
③ (b) Determine the equation of the normal at $x=-2$.

8. A dragster races down a 400m strip in 8s. Its distance, in metres, from the starting line after t seconds is $s(t) = 6t^2 + 2t$.

④ (a) Determine the dragster's velocity and acceleration as it crosses the finish line.

③ (b) How fast was it moving 60m down the strip?

⑥ 9. Sketch the graph of $y = x^4 - 8x^2 + 7$ by finding all intercepts, critical numbers, intervals of increase/decrease, inflection points and concavity information.



⑤ 11. A farmer has 800m of fencing and wishes to enclose a rectangular field. One side of the field is against a country road that is already fenced, so the framer needs to fence only the remaining three sides of the field. The farmer wants to enclose the maximum possible area and to use all the fencing. How does the farmer determine the dimensions to achieve this goal?

⑤ 12. A can is to be made to hold $1000cm^3$ of oil. Find the radius of the can that will minimize the cost of the metal to make the can.