Calculus I   name:_____
Exam 1
September 25, 2017

$$\boxed{\text{NO CALCULATORS}}$$

Do all ten problems. For maximum credit, show your work and justify your answers; answers alone will seldom receive full credit. If you show your work and if your answer is wrong, you may still receive partial credit. Each of the problems is worth 10 points.

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You know my methods, apply them!
—from *Hound of the Baskervilles*

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1. Find $\lim\limits_{x \to 1} \dfrac{(x+2)^2 - 9}{x - 1}$.

2. Find the derivative of $f(x) = x^2$ directly from the limit definition of the derivative. **Do not** use any shortcuts.

3. Compute $\dfrac{d}{dt}(3t^7 - 4t^5 + 2t^3 + \dfrac{2}{t^3})$.

4. Compute $\dfrac{d}{dx}(x^{2/3} + 3)(x^2 + 3x + 7)^3$.

5. Compute $\dfrac{d}{dx} x^2 (3x - 2)^4 \sqrt{2x + 1}$.

6. Compute $\dfrac{d}{dx} \dfrac{x^2 + 1}{x^3 \sqrt{x}}$.

7. Compute $\dfrac{d}{dx}\sqrt{1+\sqrt{1+\sqrt{x^3+x^2}}}$.

8. Compute $\dfrac{d}{dx}\dfrac{3}{(x^2+x+1)^5}$.

9. An object moves in a straight line so that its position at time t, in seconds, is $3 + 11t - 6t^2$ meters. How fast is the object going at time $t = 2$?

10. Find an equation for the tangent line to $f(x) = \sqrt{x}$ at $x = 9$.

It isn't what we don't know that gives us
trouble, it's what we know that ain't so.
—Will Rogers