Name:_____

MA 2310: Test 1

No Calculators, no cell phones, no electronic devices of any kind allowed. Justify all answers with correct work.

1. Compute the following:

    (a) $\cos(\pi/3)$

    (b) $\sin(7\pi/4)$

    (c) $\tan(5\pi/6)$

    (d) $\tan(\sin^{-1}(\frac{2x}{x+1})$

2. Compute the limit.

(a) $\displaystyle\lim_{x\to 4} \frac{x^2 - x - 12}{x - 4}$

(b) $\displaystyle\lim_{x\to 1} \frac{\frac{1}{x} - 1}{x - 1}$

(c) $\displaystyle\lim_{x\to 0} \frac{\sin(3x)}{x}$

(d) $\lim\limits_{n \to \infty} \dfrac{6n^2 + 5n + 2}{5n + 2}$

(e) $\lim\limits_{n \to \infty} \dfrac{7n^3 + 5n + 2}{2n^3 + 2}$

(f) $\lim\limits_{n \to \infty} \dfrac{4n^2 + 5n + 2}{3n^4 + 2}$

3. Write down the definition of the derivative. Compute the derivative of $f(x) = x^2 - 2$ using the definition.

4. Let $f(x) = 2x^2$. Find the equation of the tangent line at $x = -1$. Graph the function $f(x)$ and the tangent line you found.

5. Compute the derivatives of the following functions.

(a) $f(x) = x^2 - \csc(x)$

(b) $f(x) = \dfrac{x-1}{x+1}$

(c) $f(x) = e^{2x} \sec(e^{2x})$

(d) $f(x) = \sin(x^2) \cos(x^2)$

(e) $f(x) = \tan^{-1}(e^x + 1)$

(f) $f(x) = \ln(x^2 - 1)$

6. Compute the derivative implicitly.

$$xy - y^2 + \cos(xy) = 5.$$

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7. State and prove the product rule.