

## Beginning of Semester Review – Math 86: Calculus II

Calculate the derivative of the following functions:

1.  $y = (x^4 - 3x^2 + 5)^3$

2.  $y = \cos(\tan x)$

3.  $y = \sqrt{x} + \frac{1}{\sqrt[3]{x^4}}$

4.  $y = 2x\sqrt{x^2 + 1}$

5.  $y = \frac{e^x}{1+x^2}$

6.  $y = \frac{t}{1-t^2}$

7.  $y = \sin^{-1}(e^x)$

8.  $y = xe^{-1/x}$

9.  $y = \tan(\sqrt{1-x})$

10.  $y = \ln(\csc 5x)$

11.  $y = \ln(x^2 e^x)$

12.  $y = \sec(1+x^2)$

13.  $y = x \tan^{-1}(4x)$

14.  $y = \cot(3x^2 + 5)$

15.  $y = \ln\left|\frac{x^2 - 4}{2x + 5}\right|$

16.  $y = e^{\sin(2x)}$

17.  $y = e^{\cos x} + \cos(e^x)$

Find the following limits. Do not use L'Hospital's Rule or degree rules:

18.  $\lim_{x \rightarrow \infty} \frac{5x^3 - x^2 + 2}{2x^3 + x - 3}$

19.  $\lim_{x \rightarrow \infty} \frac{x^3 + 1000}{(2x^2 - 1)(x^2 + x + 2)}$

Evaluate the following limits using any method:

20.  $\lim_{x \rightarrow \infty} e^{3x}$

21.  $\lim_{x \rightarrow -\infty} e^{3x}$

22.  $\lim_{x \rightarrow \infty} xe^{-x}$

23.  $\lim_{x \rightarrow 0^+} x \ln x$

24.  $\lim_{x \rightarrow \infty} \frac{\cos(x)}{\sqrt{x}}$

Find  $f$ :

25.  $f'(x) = \sqrt{x}(6+5x), f(1) = 10$

26.  $f'(x) = 2/x, x < 0, f(-1) = 7$