

# MAT1320C, Dr. Fink - practise sheet

1. What is the domain and range of the functions?

1.  $f(x) = \frac{x+4}{x^2-9}$

4.  $f(x) = \sin(\sqrt{2x^2-2})$

7.  $f(t) = \sqrt{10^t - 100}$

2.  $f(x) = \frac{\sqrt{x-3}}{x^2+2x+1}$

5.  $f(x) = \frac{1-e^{x^2}}{1-e^{1-x^2}}$

8.  $y(x) = \frac{1+x}{e^{\cos(x)}}$

3.  $f(x) = \log(x+3)$

6.  $f(t) = \sqrt[3]{10^t - 100}$

9.  $s(t) = \ln((x-2)^2 \cdot e^{3x})$

2. Solve for  $x$ .

1.  $e^{6-4x} = 3$

4.  $\frac{x-3}{x^2+2x+1} = 1$

7.  $e^{3x} + e^{6x} = 5$

2.  $2^{x-5} = 3$

5.  $3\ln(x^2) + 2\ln(x^3) = 5$

8.  $x^4 + 4x^2 + 2 = -2$

3.  $\ln(x) + \ln(x-1) = 1$

6.  $\cos(2x) = 5$

9.  $\ln(7x+3) + \ln(2x) = 2$

3. Find a formula for the inverse of the following functions:

1.  $f(x) = 1 + \sqrt{2+3x}$

3.  $f(x) = \frac{1-e^{-x}}{1+e^{-x}}$

5.  $f(x) = \log_{10}(x+5)$

2.  $f(x) = \ln(x+3)$

4.  $f(x) = e^{2x} - 3e^x + 2$

6.  $f(x) = \ln(e^x - 3)$

4. What is the equation of the tangent line to graphs of following functions at the given points?

1.  $f(x) = 1 + \sqrt{4+3x}$  at  $(7, f(7))$ ?

3.  $f(x) = x^2 + 2x + 1$  at  $(2, 9)$ ?

2.  $f(x) = \log_3(x+3)$  at  $(6, f(6))$ ?

4.  $f(x) = \cos(2x)$  at  $(\pi/2, -1)$ ?

5. Compute the following limits.

1.  $\lim_{x \rightarrow 4} \frac{\ln(x) - \ln(4)}{x-4}$

4.  $\lim_{x \rightarrow 0} \sqrt{9+h} - 3h$

2.  $\lim_{x \rightarrow 5^+} \frac{x+1}{x-5}$

5.  $\lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x-3}$

3.  $\lim_{x \rightarrow -2} \frac{x+2}{x^3+8}$

6.  $\lim_{t \rightarrow 0} \frac{\sqrt{1+t} - \sqrt{1-t}}{t}$

7.  $\lim_{x \rightarrow \infty} (\sqrt{9x^2 + x} - 3x)$

10.  $\lim_{x \rightarrow -\infty} \frac{2x^2 + x - 1}{x^2 + x - 2}$

8.  $\lim_{t \rightarrow \infty} \frac{\sqrt{x+3x^2}}{4x-1}$

11.  $\lim_{x \rightarrow -\infty} \frac{2x^3 + x - 1}{x^2 + x - 2}$

9.  $\lim_{x \rightarrow \infty} \frac{1+x^6}{x^4+1}$

12.  $\lim_{x \rightarrow \infty} \frac{e^{3x} - e^{-3x}}{e^{3x} + e^{-3x}}$

6. Find the first and second derivatives of the following functions.

1.  $f(x) = x^3 + 3x + 1$

7.  $f(x) = \frac{\sin(3x)}{\cos(3x)}$

2.  $y(t) = \sqrt{3t^2 + \cos(t)}$

8.  $f(x) = \frac{\sin(2x)+1}{\cos(4x)}$

3.  $f(z) = e^{z^2} \sqrt{z+3}$

9.  $f(t) = \sqrt{\frac{3}{t} + 2t}$

4.  $f(x) = \frac{3+x^2}{5x^2+1}$

10.  $f(y) = y^{500} \cdot e^{y^2}$

5.  $f(x) = \frac{\sqrt{3x+1}}{6x^2+1}$

11.  $f(x) = e^{\cos(5x^2)}$

6.  $f(x) = \sin(3x^2 e^x)$

7. Compute the following derivatives by using the definition of the derivative as a limit.

1.  $f(x) = \frac{1}{x^3}$

3.  $f(x) = x^4 - 6x^3$

2.  $f(x) = \frac{2x}{x+1}$

4.  $f(x) = \frac{x+3}{x^2+3}$

8. Quote all Theorems (Thm) from the class.