

# MAT1320C

## Dr. Fink - practise sheet for the second midterm

1. Find the derivate of the following functions:

1.  $\int_0^{3x} \frac{u^2-1}{u^2+1}$

3.  $\int_3^{\sqrt{x}} \frac{t^2+1}{2t^4+5t^2+1} dt$

5.  $\int_0^{x^2} \sin(t^3+1) dt$

2.  $\int_1^{x^2} e^{t^2} dt$

4.  $\int_{\sqrt{x}}^{2x} \arctan(t) dt$

2. Differentiate the following:

1.  $x^2 - 4xy + y^2 = 4$

3.  $x^y + y = x$

6.  $2x^2 + xy - y^2 = 2$

4.  $x \cdot e^y = x - y$

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

5.  $xy = \sqrt{x^2 + y^2}$

7.  $\arctan(x^2y) = x + xy^2$

3. Related Rates:

Exercises in Chapter 3.9: 3,4,5,6,7, 13, 14, 15

4. Riemann Sums

Set up the Riemann Sums for the following areas:

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

4.  $f(x) = e^{5x}$ ,  $0 \leq x \leq 5$

2.  $f(x) = x^2 + \sqrt{1+2x}$ ,  $4 \leq x \leq 7$

3.  $f(x) = \sqrt{\sin(x)}$ ,  $-\pi/2 \leq x \leq \pi/2$

5.  $f(x) = \tan(4x)$ ,  $0 \leq x \leq \pi/6$

5. Compute the following integrals:

1.  $\int_1^9 \sqrt{x} dx$

4.  $\int \frac{x}{1+x^4} dx$

2.  $\int \frac{1+x}{1+x^2} dx$

5.  $\int (x-1)e^{(x-1)^2} dx$

3.  $\int \frac{z^2}{z^3+1} dz$

6.  $\int x^2 \sqrt{2+x} dx$

7.  $\int \frac{\sin(2x)}{1+\cos^2(x)} dx$
8.  $\int \sec^2(\theta) \cdot \tan^3(\theta) d\theta$
9.  $\int \frac{e^u}{(1-e^u)^2} du$
10.  $\int \frac{\sin(x)}{1+\cos^2(x)} dx$
11.  $\int_0^{\pi/6} \frac{\sin(t)}{\cos^2(t)} dt$
12.  $\int \cos^3(\theta) \sin(\theta) d\theta$
13.  $\int 5^t \cdot \sin(5^t) dt$
14.  $\int \cos(1+5t) dt$
15.  $\int_e^{e^4} \frac{dx}{x \cdot \sqrt{\ln(x)}}$
16.  $\int_0^1 \frac{dx}{(1+\sqrt{x})^4}$
17.  $\int_0^1 x \cdot e^{-x^2} dx$

## 6. More integrals.

1.  $\int x \cdot \cos(5x) dx$
2.  $\int x^2 e^{-x} dx$
3.  $\int (\ln(x))^2 dx$
4.  $\int t^4 \cdot \ln(t) dt$
5.  $\int \ln(\sqrt{x}) dx$
6.  $\int_0^{2\pi} x^2 \cdot \sin(x) dx$
7.  $\int_1^5 \frac{M}{e^M} dM$
8.  $\int_1^2 x^4 \cdot (\ln(x))^2 dx$
9.  $\int e^{\cos(t)} \cdot \sin(2t) dt$
10.  $\int x \cdot \ln(1+x) dx$
11.  $\int_e^{e^2} \frac{5(\ln(x))^{1/5}}{x} dx$

## 7. And more integrals.

1.  $\int_0^8 \sin(x) dx$
2.  $\int_1^9 \sqrt{x} dx$
3.  $\int_0^1 (x^e + e^x) dx$
4.  $\int_1^{\sqrt{x}} \frac{z^2}{z^4+1} dz$
5.  $\int_1^8 x^{-2/3} dx$
6.  $\int_0^4 2^s ds$
7.  $\int_1^{18} \sqrt{\frac{3}{z}} dz$
8.  $\int_0^1 (1+r)^3 dr$
9.  $\int_{1/2}^{1/\sqrt{2}} \frac{4}{\sqrt{1-x^2}} dx$
10.  $\int_{1/\sqrt{3}}^{\sqrt{3}} \frac{8}{1+x^2} dx$