

WORKSHEET 34

a.k.a. Practice Exam 3

1. (**warm-up**) Compute the following antiderivatives:

a) $\int \frac{e^{2x} + e^x}{e^x} dx$ b) $\int \frac{x^5 + x + 1}{x} dx$ c) $\int (2 \cos x + \sec^2 x) dx$ d) $\int \frac{1 + \sqrt{x}}{\sqrt{x}} dx$

2. Compute the following indefinite integrals:

a) $\int \frac{x}{\sqrt{1+x}} dx$ b) $\int \frac{1}{\sin^2 x \sec x} dx$ c) $\int x\sqrt{1-x^2} dx$

3. Compute the following definite integrals:

a) $\int_0^{\pi/4} 2 \sec x \tan x dx$ b) $\int_1^{e^2} \frac{1}{x(1-\ln x)} dx$ c) $\int_0^1 x\sqrt{e^{x^2}} dx$
d) $\int_0^1 \frac{1}{\sqrt{e^x}} dx$ e) $\int_0^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

4. Let $f(x) = x(\ln x)^2$ on the interval $[e^{-4}, e^1]$.

- Differentiate and simplify.
- Find all points c where $f'(c) = 0$ or $f'(c)$ does not exist.
- Use the first derivative test to classify the above points.
- Find all local and global extremes

5. Let $f(x) = xe^{-x^2}$ on the interval $[-1, 1]$.

- Differentiate and simplify.
- Find all points c where $f'(c) = 0$ or $f'(c)$ does not exist.
- Use the first derivative test to classify the above points.
- Find all local and global extremes

6. Integrate:

a) $\int x(x+1)^5 dx$ b) $\int_1^e \frac{\sqrt{\ln x}}{x} dx$ c) $\int e^x \sqrt{e^x} dx$ d) $\int \frac{\sec^2 x}{\tan x} dx$