

Math 106, Spring 2018

**Homework #18**

Due **Friday April 6th** at the beginning of class.

1. Sketch  $f(x) = e^x$ . Answer each of the following:

(a) What is the Domain?

(b) What is the Range?

(c)  $\lim_{x \rightarrow \infty} e^x =$

(d)  $\lim_{x \rightarrow -\infty} e^x =$

2. Consider  $f(x) = e^x + \frac{1}{e^x} + x^e + \frac{1}{x^e} + \frac{x}{e} + e + \frac{e}{x^2} + ex + \frac{1}{e^3 x^3}$ .

(a) Compute  $f'(x)$ .

(b) Compute  $\int f(x) dx$ .

3. Consider  $f(x) = e^{7x} + \frac{1}{7e^{7x}} + e^7 + \frac{7}{e^x} + \frac{7}{e^7} + e^{7-x} + \frac{1}{e^{7-x}} + e^{\sqrt{7-x}}$ . Compute  $f'(x)$ .

4. Consider  $f(x) = e^{\tan x} + \frac{1}{e^{\sec x}}$ . Compute  $f'(x)$ .

5. Consider  $f(x) = \frac{1}{e^{\tan x}} + \frac{1}{\sec(e^x)}$ . Compute  $f'(x)$ .

6. Consider  $f(x) = \cos \sqrt{e^x + e^7} + e^{\sqrt{7x+7 \cos x}} + \sqrt{e^{7x} - \sin x}$ . Compute  $f'(x)$ .

7. Consider  $f(x) = \frac{1}{\sin \sqrt{e^x + e^7}} + \frac{1}{e^{\sqrt{7x+7 \sin x}}} + \frac{1}{\sqrt{e^{7x} - \sin x}}$ . Compute  $f'(x)$ .

8. Find the equation of the tangent line to the curve  $e^{xy} + \tan(x^2) = e^{y-1} - \sin(e^x - 1)$  at the point  $(0, 1)$ .

9. Compute each of the following integrals:

$$(a) \int \frac{e^x}{\sqrt{e^x + 1}} dx$$

$$(b) \int \frac{1}{\sqrt{x} e^{1+\sqrt{x}}} dx$$

$$(c) \int \frac{e^{5x}}{(7 + e^{5x})^{\frac{5}{7}}} dx$$

$$(d) \int \frac{(1 + e^{3x})^2}{e^{3x}} dx$$

$$(e) \int \frac{e^{3x}}{(1 + e^{3x})^2} dx$$

$$(f) \int \frac{1}{e^{3x}(1 + e^{-3x})^6} dx$$

$$(g) \int e^{3x}(1 + e^{3x})^6 dx$$

$$(h) \int \frac{\sin x \cos x}{e^{\sin^2 x}} dx$$

$$(i) \int \frac{e^x \cos e^x}{\sin^2(e^x)} dx$$

$$(j) \int \left( e^{3x} + \frac{1}{e^{2x}} \right) \left( 1 + \frac{1}{e^{4x}} \right) dx$$