

Show all work to receive full credit.

1. (20 points) Evaluate the following limits

(a)  $\lim_{x \rightarrow \infty} \frac{\ln(2 + e^x)}{x}$

(b)  $\lim_{x \rightarrow 0^+} x^x$

2. (10 points each) Evaluate the following integrals.

(a) Evaluate  $\int_1^2 \frac{\ln x}{x^2} dx$

(b) Evaluate  $\int \sec^4(x) \tan^7(x) dx$

(c) Evaluate  $\int_0^1 \frac{e^{\tan^{-1} x}}{1+x^2} dx$

(d) Evaluate  $\int \frac{-x-12}{x(x+2)(x-3)} dx$

(e) Evaluate  $\int \frac{8 dx}{x^2 \sqrt{1-x^2}}$

3. (16 points) Evaluate the following. No work need be shown.

(a)  $\int \cos(3x) dx$

(b)  $\int \csc x dx$

(c)  $\int \frac{-1}{\sqrt{1-x^2}} dx$

(d)  $\int \ln x dx$

4. Let  $y = \frac{1}{3}x^3$ .

(a) (7 pts) Set up the integral for the length of  $y$  over  $0 \leq x \leq 3$ . DO NOT EVALUATE.

(b) (7 pts) Set up the integral that represents the area of the surface obtained by rotating  $y$  about the  $x$ -axis.