

Show all work to receive full credit.

1. (20 points) Evaluate the following limits

(a) $\lim_{x \rightarrow 2} \frac{e^x - e^2}{xe^x - e^x - e^2}$

(b) $\lim_{x \rightarrow \infty} x^{1/x}$

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

(a) Evaluate $\int_1^e x^4 \ln(x) dx$

(b) Evaluate $\int \sec^4(x) \tan^{40}(x) dx$

(c) Evaluate $\int_0^1 \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$

(d) Evaluate $\int \frac{4x}{(x-1)^2(x+1)} dx$

(e) Evaluate $\int \frac{1}{\sqrt{25 + x^2}} dx$

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

(a) $\int \sin(4x) dx$

(b) $\int \tan x dx$

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

(d) $\int \ln x dx$

4. Let $f(x) = 4x^2$, $1 \leq x \leq 3$.

(a) (7 pts) Set up the integral for the length of $f(x)$ over $1 \leq x \leq 3$. DO NOT EVALUATE.

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