

Name: _____ ID #: _____

NO CALCULATORS

1. [20 points] For each problem find the limit or show why it diverges.

a. $\lim_{x \rightarrow \infty} \frac{\ln x}{\sqrt{x}}$

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

e. $\lim_{x \rightarrow 1} \frac{\arctan(x) - (\pi/4)}{x - 1}$

d. $\lim_{x \rightarrow \infty} e^{-x} \tan x$

2. [40 points] For each problem evaluate the integral or show why it diverges.

a. $\int_0^2 x^{-7} dx$

b. $\int_{-1}^1 \frac{2}{x^2 - 1} dx$

c. $\int_0^\infty e^{-x} \cos x dx$

d. $\int_{-\infty}^\infty \frac{1}{9x^2 + 4} dx$

3. [40 points] Do these integrals.

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

b. $\int \sec^3 x \, dx$ Hint: use integration by parts.

c. $\int_{-\pi}^{\pi} \sin 2x \sin 5x \, dx$

d. $\int \frac{1}{\sqrt{2x - x^2}} \, dx$ Hint: complete the square.