

Name _____

1. (10 points each) Evaluate the following integrals.

(a) $\int \frac{10x + 3}{x^2 + 1} dx$

$$(b) \int \frac{5x + 1}{x^2 + 2x - 15} dx$$

$$(c) \int e^{-x} \cos x \, dx$$

$$(d) \int \frac{\ln x}{\sqrt{x}} dx$$

$$(e) \int \frac{\sec^4 x}{\tan x} dx$$

$$(f) \int \frac{1}{\sqrt{4-x^2}} dx$$

$$(g) \int \sin x \cos x \tan x \, dx$$

$$(h) \int 2x \tan^{-1} x \, dx$$

2. (10 points) Evaluate the following improper integral. Show all steps used to arrive at your answer and be sure to use correct notation in each step.

$$\int_2^{\infty} \frac{6}{x^2} dx$$

3. (10 points) We have the following sequence.

$$\frac{5n + 1}{10n + 1}$$

(a) Does this sequence converge or diverge? You must fully justify your claim. If the sequence converges, be sure to find its limit.

(b) Is this sequence strictly increasing or strictly decreasing? You must fully justify your claim.