

Exam II

Name _____

1. Integrate the following

(a) $\int 4x \sin(3x) dx$

(b) $\int \sin(2x) \sqrt{1 - \cos(2x)} dx$

(c) $\int \frac{5x + 4}{x^2 + x - 2} dx$

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

$$(e) \int \frac{\sqrt{x-4}}{x+5} dx$$

$$(f) \int \tan^3(x) dx$$

$$(g) \int x^4 \ln(x) dx$$

2. Tell whether the integral converges or diverges. If it converges, give the limit. If it diverges, show why.

(a) $\int_0^{\infty} \frac{x}{1+x^2} dx$

(b) $\int_{1.5}^{15} \frac{dx}{\sqrt[3]{2x-3}}$

3. Solve the following differential equation for $y(x)$.

$$y' = x + xy^2 \qquad y(0) = 1$$

4. Suppose a company's net worth increases at a continuous rate of 5% $\left(.05 = \frac{1}{20}\right)$ per year due to interest on its assets. At the same time, the company's payroll obligations amount to \$200 million a year, paid out continuously.

Let $W(t)$ be the net worth of the company in millions of dollars. Write and solve the differential equation assuming $W(0) = 3000$.

Hint:

rate in = _____

rate out = _____