

MTH112 – TEST 3

Name: _____

HONOR CODE: On my honor, I have neither given nor received any aid on this examination.

Signature: _____

Note: Show all work on exam in order to receive full credit.

1. Integrate:

$$(a) \int_3^7 \frac{1}{(x+1)(x-2)} dx$$

$$(b) \int \frac{1}{x(x+1)(x+2)} dx$$

$$(c) \int \frac{x}{(x-3)(x+2)^2} dx$$

$$(d) \int \frac{5x^2 + 3x - 2}{x^3 + 2x^2} dx$$

2. Integrate:

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

(b) $\int \sqrt{3-2x-x^2} dx$

(c) $\int \frac{\sqrt{9x^2-4}}{x} dx$

(d) $\int \frac{x}{(x^2+4)^{5/2}} dx$

3. Integrate:

(a) $\int \sin x + x^5 dx$

(b) $\int \frac{1 + \sqrt{x+4}}{x} dx$

(c) $\int \pi \sin x + \cos(1/2) \tan(\pi x) dx$

(d) $\int (1 + \sqrt{x})^2 dx$

4. Integrate:

$$(a) \int \frac{1}{x - \sqrt[3]{x}} dx$$

$$(b) \int_1^3 \frac{\sqrt{x-1}}{x+1} dx$$

$$(c) \int \frac{1}{\sqrt{1+\sqrt{x}}} dx$$

$$(d) \int \frac{\sqrt[3]{x} + 1}{\sqrt[3]{x} - 1} dx$$

5. (a) Factor $x^4 + 1$ as the difference of squares by first adding and subtracting the same quantity. Use this factorization to evaluate:

$$\int \frac{1}{x^4 + 1} dx$$

- (b) Integrate:

$$\int e^x \cos(3x + 4) dx$$

- (c) Write out the form of the partial fraction decomposition for this function: — do *not* determine the numerical values of the coefficients:

$$\frac{1}{x^6 - x^3}$$

- (d) Find the limit:

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