

MATH 152, 525-530, 534-536, Spring 2013, Sample problems for Test 2

1. Evaluate the integral

(a) $\int \frac{x^2}{\sqrt{5-x^2}} dx$

(b) $\int \frac{x^3}{\sqrt{x^2+4}} dx$

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

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

(e) $\int \frac{x^2+3x-1}{x-1} dx$

(f) $\int_0^{\infty} \frac{dx}{(x+2)(x+3)}$

(g) $\int_{-\infty}^1 \frac{dx}{(2x-3)^2}$

(h) $\int_4^5 \frac{dx}{(5-x)^{2/5}}$

2. Write out the form of the partial fraction decomposition of the function

$$\frac{x^3+x-1}{(x^2-1)(x+1)(x^2+1)^2}.$$

Do not determine the numerical values for the coefficients.

3. Find the length of the curve $x(t) = 3t - t^3$, $y(t) = 3t^2$, $0 \leq t \leq 2$.

4. Find the area of the surface obtained by rotating the curve $y = x^3$, $0 \leq x \leq 2$ about the x -axis.

5. Find the area of the surface obtained by rotating the curve $x = \sqrt{2y - y^2}$, $0 \leq y \leq 1$ about the y -axis.

6. Find the following limits

(a) $\lim_{n \rightarrow \infty} \frac{\sqrt{n}}{\ln n}$

(b) $\lim_{n \rightarrow \infty} \frac{1 - 2n^2}{\sqrt[3]{n^6 + 1} + 2n^2}$

(c) $\lim_{n \rightarrow \infty} (\sqrt{n+1} - \sqrt{n})$

7. Find the sum of the series

$$(a) \sum_{n=1}^{\infty} \frac{2^{2n+1}}{3^{3n-1}}$$

$$(b) \sum_{n=3}^{\infty} \frac{1}{n^2 - 4}$$