

Spring 2018 MTH 32. Review sheet for test 3

1. Find the following integrals

(a) $\int \sqrt{1+e^x} dx$

(f) $\int \frac{\cos 1/x}{x^3} dx$

(b) $\int \frac{x^2+1}{x^2-6x+8} dx$

(g) $\int \sin^5 t \cos^4 t dt$

(c) $\int \frac{\sin^3 x}{\cos x} dx$

(h) $\int_1^3 \frac{e^{3/x}}{x^2} dx$

(d) $\int_1^e \sqrt{t} \operatorname{Ln} t dt$

(i) $\int_0^2 \frac{4}{\sqrt{x^2+4}} dx$

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

(j) $\int \tan x \sec^3 x dx$

2. Find the following improper integrals. If it does not converge, write ‘the integral is divergent’.

(a) $\int_0^5 \frac{1}{5-x} dx$

(d) $\int_{-\infty}^{\infty} \frac{1}{x^2+1} dx$

(b) $\int_0^{\infty} \sin \theta e^{\cos \theta} d\theta$

(e) $\int_{-\infty}^{\infty} x e^{-x^2} dx$

(c) $\int_0^{\infty} e^{-\sqrt{x}} dx$

(f) $\int_0^{\pi/2} \frac{\cos x}{\sqrt{\sin x}} dx$

3. Find the length of the curve.

(a) $y = \frac{x^4}{8} + \frac{1}{4x^2}, 1 \leq x \leq 2.$

(c) $y = 2 + \cosh x, 0 \leq x \leq 3.$

(b) $y = 1 - e^{-x}, 0 \leq x \leq 2.$

(d) $y = \operatorname{Ln}(\cos x), 0 \leq x \leq \pi/3.$

4. Find the exact area of the surface obtained by rotating the given curve around the x -axis.

(a) $y = \tan^{-1} x, 0 \leq x \leq 2.$

(c) $y = \sqrt{1+e^x}, 0 \leq x \leq 1.$

(b) $y = \sqrt{5-x}, 3 \leq x \leq 5.$

(d) $y = \frac{x^3}{6} + \frac{1}{2x}, \frac{1}{2} \leq x \leq 1.$

5. Sketch the graph of the curve given in polar coordinates (r, θ) when r is given by the following equations. It may help to first sketch the graph of the equation thinking of (r, θ) as cartesian coordinates.

(a) $r = 1 + \cos 2\theta.$

(d) $r = \sin(\theta/2).$

(b) $r = 1/\theta.$

(c) $r = 3 \cos 3\theta.$

(e) $r = \sin(5\theta).$