

Math 3B Practice Exam #2

1. Integrate by parts:

a) $\int_0^1 \arctan x \, dx$ b) $\int x^3 e^x \, dx$ c) $\int e^x \sin x \, dx$

2. Integrate (without tables):

a) $\int \cos^3 x \sin^2 x \, dx$ b) $\int \cos^2 3x \, dx$ c) $\int \tan^2 x \sec^4 x \, dx$

3. Integrate using trig. substitution:

a) $\int \frac{1}{x^2 \sqrt{4-x^2}} \, dx$ b) $\int \frac{\sqrt{x^2-4}}{x} \, dx$ c) $\int \frac{1}{x \sqrt{4x^2+9}} \, dx$

4. Integrate using the method of partial fractions:

a) $\int \frac{x^2-6}{x(x-1)^2} \, dx$ b) $\int \frac{2x^2+x+8}{(x^2+4)^2} \, dx$ c) $\int \frac{x+4}{x^3+x} \, dx$

5. Use the tables to integrate:

a) $\int \sqrt{3+x^2} \, dx$ b) $\int \frac{e^x}{(1-e^{2x})^{3/2}} \, dx$

6. Integrate any way you want:

a) $\int \frac{x^2}{x^2+2x-15} \, dx$ b) $\int \frac{1}{1-\sin x} \, dx$ c) $\int \frac{16}{\sqrt{16-x^2}} \, dx$ d) $\int \sqrt{\frac{x-2}{x+2}} \, dx$

e) $\int \frac{1}{2x\sqrt{3x-1}} \, dx$

7. Set up the integrals you would use to find (x, y) , the centroid of the region bounded by $y = -x^2$ and $y = -x - 2$.

8. Find the volume of the torus formed by revolving the circular region bounded by $x^2 + (y + 4)^2 = 4$ about the x -axis.

9. Integrate the following. 10. Determine the convergence or divergence of the following integral. If it converges, evaluate it.

a) $\int_0^1 \frac{\ln x}{x^2} \, dx$ b) $\int_2^{\infty} \frac{1}{(x+4)^2} \, dx$

11. Evaluate the following limits:

a) $\lim_{x \rightarrow e} \left[\frac{\ln(\ln x)}{\ln x - 1} \right]$ b) $\lim_{x \rightarrow \infty} \left[x \tan \frac{1}{x} \right]$