Math 192 Review for Final 2 Name & Number:

1. Use the Trapezoid rule and midpoint rule with n = 4 to approximate the integral $\int_1^5 \frac{1}{x}dx$.

2. Consider the integral $\int_0^{0.5} \cos(x^3)dx$. By the Midpoint rule with n equal subintervals, give an estimate for n which guarantee that the error is bounded by $1/10^4$.

3. Consider $\int_1^3 \frac{1}{x^2}dx$ using the Trapezoid Rule with n =4. Then use the error bound $|E_T| \le \frac{k(b-a)^3}{12n^2}$ to estimate the accuracy.

4. Evaluate the following improper integral.

(a) $\int_1^\infty \frac{\ln x}{x^2}dx$ (b) $\int_0^1 \frac{\ln x}{x^2}dx$ (c) $\int_{-\infty}^\infty \frac{1}{4+x^2}dx$ (d) $\int_0^1 x^{-1/2}dx$ (e) $\int_3^\infty \frac{1}{x^2-x-2}dx$

5. Use comparison Theorem to determine whether the following is convergent or divergent. Justify your answer.

(a) $\int_1^\infty \frac{\cos^2 x}{x^3}dx$ (b) $\int_0^\infty \frac{1}{\sqrt{x}+1}dx$

6. Find the area of the region bounded by the curves given below. Sketch the region, too.

(a) $y = x^3 - 2x$ and $y = -x$

(b) $x = y^2 - 7$ and $x = y - 1$

7. Find the volume of the solid generated by revolving the region between the parabola $x = y^2 + 1$ and the line $x = 3$ about the line $x = 3$. Sketch the region!

8. The region in the first quadrant enclosed by the parabola $y = x^2$, the y-axis, and the line $y = 1$ is revolved about the line $x = 3/2$ to generate a solid. Find the volume of the solid.

9. Find the arc length of the curve given below.

(a) the curve $y = \frac{2}{3}(x-1)^{3/2}, 1 \le x \le 4$

(b) parametric curve $x = \cos^2 t, y = \sin^2 t, 0 \le t \le \frac{\pi}{2}$

10. A particle is moving along a straight line so that its velocity at time t is $v(t) = 3t^2$. At what time t during the interval $0 < t < 3$ is its velocity the same as its average velocity over the entire interval?

Answers:

1. Trapezoid: 101/60 Midpoint: 496/315 2. n=14(answer may vary) 3. $|E_T| \le \frac{1}{4}$

4. (a) 1 (b) Divergent (c) $\pi/2$ (d) 2 (e) $\frac{1}{3}\ln 4$ 5. (a) Convergent (b) Divergent

6. (a) ½ (b) 125/6 7. $\frac{64\pi\sqrt{2}}{15}$ 8. $\frac{3\pi}{2}$

9. (a) 14/3 (b) $\sqrt{2}$

10. $t = \sqrt{3}$