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+ 5 Bonus points possible!

Name: ANSWERS

Instructions: Use your own scrap paper and write your answers in the space provided.

1. State the three things that can make the integral $\int_a^b f(x) dx$ improper:i. $a = -\infty$ and/orii. $b = \infty$ and/oriii. $f(x)$ is discontinuous at finitely many points in $[a, b]$.

2. Compute the following integrals if they converge, if they diverge, so state:

(a) $\int_2^{\infty} \frac{dx}{\sqrt{x}} =$ diverges (b) $\int_0^1 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx =$ $2(e-1)$

(c) $\int_0^1 x^2 \ln\left(\frac{1}{x}\right) dx =$ $\frac{1}{9}$ (d) $\int_{-\infty}^0 \frac{x^3}{1+x^8} dx =$ $-\frac{\pi}{8}$

Bonus:

1. (All or nothing) Use the Comparison Theorem to determine whether or not the following integral converges. If it diverges, state "diverges" below, if it converges, enter the value it converges to.

$$\int_0^1 \frac{\sec^2 x}{x\sqrt{x}} dx =$$
 diverges

What integral did you compare it to? $\int_0^1 \frac{1}{x\sqrt{x}} dx = \int_0^1 \frac{1}{x^{3/2}} dx$ 2. Consider the definite integral $\int_a^b f(x) dx$

(a) Name three numerical approximation techniques for approximating the integral above:

(Any three of) Lefthand rule, Righthand rule, Midpoint rule, Trapezoid rule, Simpson's rule.(b) State formulas for: $\Delta x =$ $\frac{b-a}{n}$ and $x_i =$ $a + i\Delta x$
used in these approximation methods.