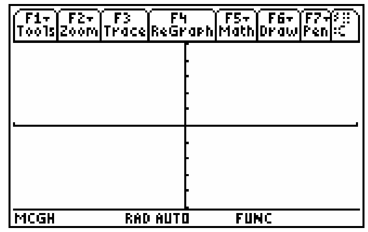
Assignment 17: Improper Integrals (6.6) **Name______________________**
Please provide a handwritten response.

1a. The integrals $\int_{-1}^{1} \frac{1}{x} dx$ and $\int_{-1}^{1} \frac{1}{x^2} dx$ are both improper and divergent. Sketch graphs of both $y = \frac{1}{x}$ and $y = \frac{1}{x^2}$ on the set of axes provided below. Be sure to label which graph is which.



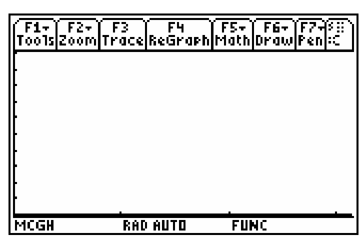
$-1 \le x \le 1, -100 \le y \le 100$

1b. Try to evaluate $\int_{-1}^{1} \frac{1}{x} dx$ on your calculator by entering $\int(1/x, x, -1, 1)$. Record the result below. Does your calculator give you a value for this integral?

1c. Likewise evaluate $\int_{-1}^{1} \frac{1}{x^2} dx$ by executing $\int(1/x \wedge 2, x, -1, 1)$ and record the result below.

1d. Does your calculator confirm that each of these integrals is divergent? Explain carefully below why your calculator gives the results that it does.

2a. Sketch the graph of $f(x) = \frac{1}{\sqrt{1+\cos x}}$ over $0 \le x \le \pi$ on the axes provided below and explain why the integral $\int_{0}^{\pi} \frac{1}{\sqrt{1+\cos x}} dx$ is improper.



$0 \le x \le \pi, 0 \le y \le 20$

2b. Execute the command $\int\left(1/\sqrt{}\left(1+cos(x)\right),x,0,\pi\right)$ and record the result below. Does this integral converge?

2c. Execute the command $\int\left(1/\left(1+cos(x)\right)\wedge.5,x,0,\pi\right)$ and record the result below. Does this integral converge?

2d. Execute the command $\int\left(1/\left(1+cos(x)\right)\wedge\left(1/2\right),x,0,\pi\right)$ and record the result below. Does this integral converge?

3. Evaluate $\int_0^\infty x^2 e^{-2x}dx$ by executing $\int\left(x\wedge 2*e\wedge\left(-2x\right),x,0,\infty\right)$ and record the result below.

4a. Evaluate $\int_{-\infty}^{\infty}\frac{dx}{1+x^2}$ by executing $\int\left(1/\left(1+x\wedge 2\right),x,-\infty,\infty\right)$ and record the result below.

4b. Evaluate $\int_{-\infty}^{\infty}\frac{dx}{2+x^2}$ and $\int_{-\infty}^{\infty}\frac{dx}{3+x^2}$. What conclusions can you draw?