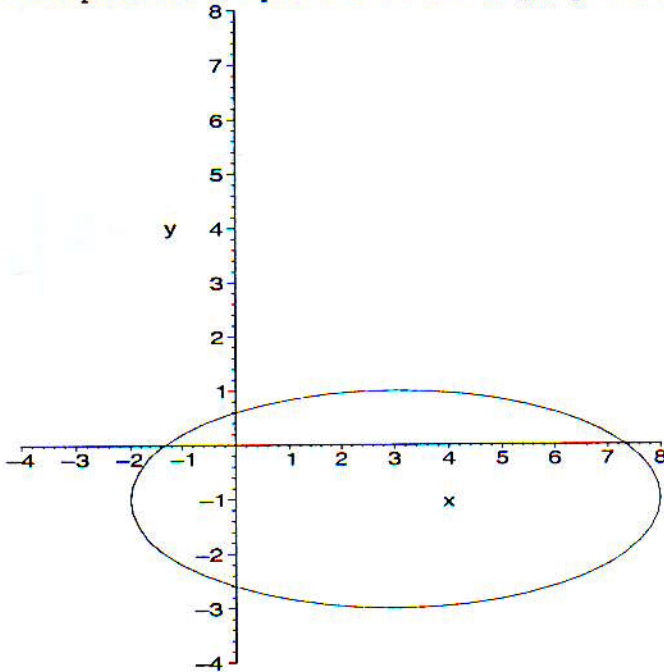


Name: Grading Guide

Each problem is worth 15 points. Show all your work.

1. Find parametric equations for the ellipse pictured below.



- ~~7~~ Gives correct cartesian equation - is vaguely reminiscent
- ~~11~~ almost corr, -15 totally off
- 3 doesn't use consistent shift/stretch
- 1 wrong shift
- 4 Uses $\sin t^2$ or similar
- ~~10~~ ~~10~~ ~~10~~ wrong parametric eqns

2. State the formal definition of the limit, and use it to show that

$$\lim_{x \rightarrow 0} x^4 = 0$$

- 3 Gets order of qualifiers wrong in def
- 3 Gets order of implications wrong in pf
- ~~7~~ Doesn't state the formal definition, or states something totally wrong
- 2 Leaves out δ step
- 3 ~~10~~ ~~10~~ Sets $\delta = \epsilon^{1/4}$ correctly
- 5 sets $\delta =$ some expression not involving ϵ
- 13 Doesn't use formal def., gets in formal def. correct or does correct estimate

3. Let $f(x) = \frac{|x|}{x} + 4$ and $g(x) = -\frac{2|x|}{x} + 8$. For each of the limits listed below, find the limit or explain why it does not exist.

(i) $\lim_{x \rightarrow 0^+} f(x)$

1 pt

(ii) $\lim_{x \rightarrow 0^-} f(x)$

(iii) $\lim_{x \rightarrow 0} f(x)$

(iv) $\lim_{x \rightarrow 0^+} g(x)$

(v) $\lim_{x \rightarrow 0^-} g(x)$

(vi) $\lim_{x \rightarrow 0} g(x)$

(vii) $\lim_{x \rightarrow 0^+} (f+g)(x)$

(viii) $\lim_{x \rightarrow 0^-} (f+g)(x)$

(ix) $\lim_{x \rightarrow 0} (f+g)(x)$

(x) $\lim_{x \rightarrow 0^+} (fg)(x)$

(xi) $\lim_{x \rightarrow 0^-} (fg)(x)$

(xii) $\lim_{x \rightarrow 0} (fg)(x)$

(1 for one, 3 for correct reason)

4. Find

$$\lim_{x \rightarrow \infty} \frac{\cos x}{e^x}$$

- 11 Tries to use quotient law
- 8 Starts something that looks like squeeze thm but doesn't get anywhere
- 13 Doesn't show any work
- 2 Gets $\lim_{x \rightarrow \infty} e^x$ wrong
- ~~14~~ 14 Claims limit 0/0
- 15 tries to use direct substitution
- 9 does correct numerical approximation
- 1 Uses strict inequalities

5. Find

$$\lim_{h \rightarrow 0} \frac{\sqrt{9+h} - 3}{h}$$

- 6 Severe algebra
- 3 leaves out limit sign
- 13 Does a numerical estimate
- 13 Doesn't multiply & divide by the conjugate

6. Approximate π to one place after the decimal using bisection on the function $f(x) = \sin x$.

- 2 Arithmetic
- 5 Doesn't get down to first decimal
- 11 Does something that looks like \overline{BT} but no bisection
- 15 Just does $\sin(\pi) = 0$ or similar
- 23 Careless errors such as picking wrong endpoint.
- 8 Confuse a with π etc.

7. Show that $f(x) = \begin{cases} x^2 & x \geq 2 \\ 5x - 6 & x < 2 \end{cases}$ is continuous at $x = 2$.

- 3 Doesn't check $f(2)$
- 5 Doesn't use 1-sided limits
- 3 Doesn't say anything about 2-sided limits
~~or~~ left = right
- 1 mixes up left & right-hand limits
- 13 Just draws a graph
- 1 Cites an irrelevant Thm
- 10 Uses (correct) numerical estimate for limit