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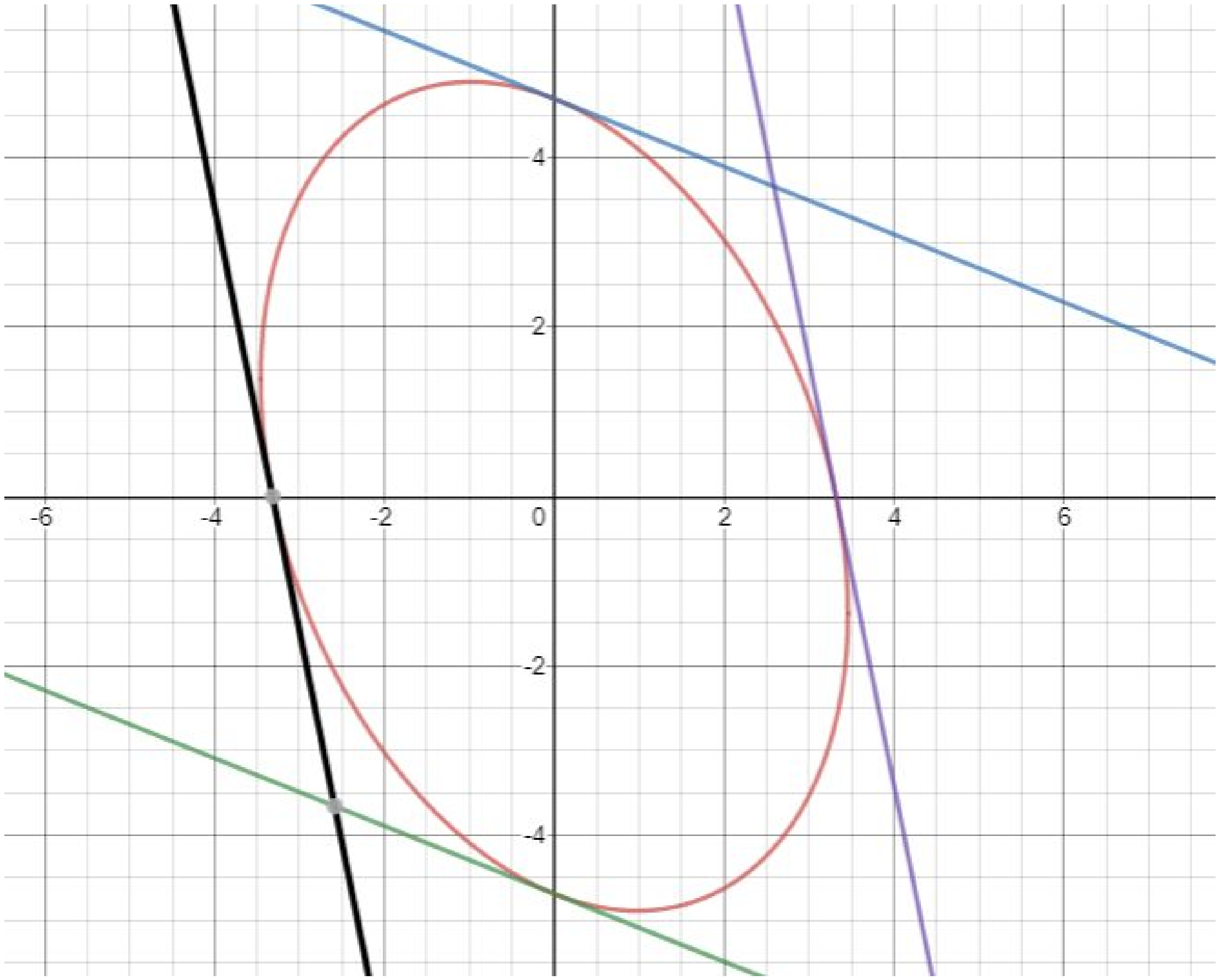
Homework Problems for Assignment 6

Recitation Section 503

1. Using implicit differentiation, we get $\cos(x+y)(1+y')+\sin(y)y'=1$, and if we solve for y', we get $y'=\frac{1-\cos(x+y)}{\cos(x+y)+\sin(y)}$. Now, to get the slope, we plug in our point's coordinates, (0, **π**/4): $y'=\frac{1-\cos(\frac{\pi}{4})}{\cos(\frac{\pi}{4})+\sin(\frac{\pi}{4})}$. Using the unit circle we can simplify this further to get $\frac{1-\frac{\sqrt{2}}{2}}{\sqrt{2}}$, or $\frac{1}{\sqrt{2}}-\frac{1}{2}$. Lastly, we use this value in point-slope form to get: $y-\frac{\pi}{4}=x(\frac{1}{\sqrt{2}}-\frac{1}{2})$
2. It is easy to find intercepts, all you do is plug in 0 for x or y and solve for the remaining variable. Thus, $0+5y^2+0=110 \Rightarrow y= \pm\sqrt{22}$ and $10x^2+0+0=110 \Rightarrow x= \pm\sqrt{11}$, so the coordinates are $(0,\sqrt{22}),\ (0,-\sqrt{22}),\ (\sqrt{11},\ 0),\ (-\sqrt{11},\ 0)$
3. Implicit differentiation gives us $20x+10yy'+4xy'+4y=0$, and solving for y' gives us $y'=\frac{-20x-4y}{10y+4y}$. Now we just plug in the coordinates from the last question and use the acquired slopes in point-slope form equations: $y-\sqrt{22}=\frac{-2}{5}x$, $y+\sqrt{22}=\frac{-2}{5}x$, $y=-5(x+\sqrt{11})$, $y=5(x+\sqrt{11})$
4.



5. $y = e^{\ln(f(x)^{g(x)})} = e^{g(x)\ln(f(x))}$. Use the chain rule and product rule to get
$e^{g(x)\ln(f(x))}(g(x)\frac{1}{f(x)}f'(x) + g'(x)\ln(f(x)))$