MATH 202, Spring 2024 **Name:** ____________________

In class work 23 **Row and Seat**: ____________________

In class work **23** has questions **1** through **3** with a total of **6** points. Turn in your work at the end of class *on paper*. This assignment is due *Tuesday 16 April 13:20*.

"There's no problem so awful that you can't add some guilt to it and make it even worse."

CALVIN (BILL WATTERSON)

$\boxed{2}$ 1. Find the Taylor polynomial of order four centered at zero for the cosine function; that is find the polynomial $P_4(x) = \sum_{k=0}^{4} \frac{\cos^{(k)}(0)}{k!} x^k$. You'll need to find the numerical values of $\cos^{(0)}(0), \cos^{(1)}(0), \cos^{(2)}(0), \cos^{(3)}(0)$, and $\cos^{(4)}(0)$.

$\boxed{2}$ 2. Use Desmos to graph $y = \cos(x)$ and $y = P_4(x)$, the Taylor polynomial of order four centered at zero for the cosine function. Reproduce the graph here. Use the graph to estimate maximum of $\max_{-2 \le x \le 2} |\cos(x) - P_4(x)|$.

$\boxed{2}$ 3. Find the Taylor polynomial of order four centered at zero for the *square* of the cosine function. You could *suffer* through the calculation by finding the first four derivatives of $\cos(x)^2$ and evaluate them at zero. Or you could use Cauchy product that we learned the other day. The easy way to to this to (a) use your polynomial P_4 from Question 1. Then the Taylor polynomial of order four centered at zero for the *square* of the cosine function is $P_4(x)P_4(x)$, but when you expand this product, set every power of x that exceeds 4 to zero.