Problem Set #7

Due Thursday, November 19, 2020 @ midnight
Submit as single pdf file to onCourse

1. (a) Evaluate the integral $\int f(x)\,dx = \int \cos(x)\sqrt{\sin(x)+3}\,dx$

   (b) Graph your antiderivative $F(x)$and the integrand $f(x)$ on the same set of axes to verify that your antiderivative is correct. Include a copy of your graph, either as a sketch or by exporting from Desmos or another graphing utility.

   (c) Also verify that your antiderivative $F(x)$ is correct by taking its derivative and comparing to $f(x)$.

   General tip: It's a good habit to always do parts (b) & (c) to verify that your antiderivative is correct!

2. (a) Evaluate $\displaystyle\int_{-1}^{3} \frac{1+5x}{1+2x+5x^2}\,dx$

   (b) Graph the integrand on the interval $[-1, 3]$. Does your answer from part (a) make sense? Include a copy of your graph, either as a sketch or by exporting from Desmos or another graphing utility.

3. Evaluate $\int 2x\sin(x^2-2)\,e^{\cos(x^2-2)}\,dx$.

4. (a) Evaluate $\int 2\cos(x)\sin(x)\,dx$ using substitution with $u = \sin(x)$.

   (b) Evaluate $\int 2\cos(x)\sin(x)\,dx$ using substitution with $u = \cos(x)$.

   (c) One consequence of the Mean Value Theorem is that any two antiderivatives of the same function are supposed to differ by a constant.

   Look at your answers to parts (a) and (b). Why don't your answers contradict this result?