TEST PREP on Taylor Notes 4-5 - Dr. Loveless

Comments on Taylor Series Some things you may need in these sections:

- Taylor Notes - Department text for this topic. Read for theory, proofs and more examples.

- Taylor Notes 4-5 Review - Dr. Loveless Full Review and Summary of TN 4-5

- Taylor Lecture Handout - I always hand this out during my last week of class (I won't get to do it this quarter, you'll just have to click on it).

Note: On the next several pages you will find seven old final questions relating to Taylor series. This is way, way, way more than can be covered in one quiz section. My intention here is to give you lots of examples. Attempt the first few on your own and in groups (and with our TA). Then try the others (or any from old finals) in the days leading up to the final. The final exam does not provide full solutions (just answers), but I did just write up solutions to these seven problems and I will be covering many of other old final questions during the live-stream. By the end of this week, I will have provided solutions or videos to most the old finals, so I'll give you plenty of things for more practice. Hope this helps.

PARTICIPATION CODE: Don't forget to ask your TA for the participation code! Enter this on Test Prep Quiz for today on Canvas before the end of quiz section!

(I) Winter 2018 - **Final Exam**

7. Let $f(x) = x^2 \sin(x^3) + \dfrac{1}{8 - x^3}$.

   (a) Find $T_6(x)$ based at $b = 0$. Note: Please, please don't try to find six derivatives, first find the series, then keep everything up to x^6.

   (b) Give the interval of convergence for the Taylor series for $f(x)$ based at $b = 0$.

Examples of substituting into known series and then integrating

(II) Spring 2016 - Final

8. Let $F(x) = \int_0^x \dfrac{t^3}{9 + t^2}\, dt$

   (a) Find the Taylor series for $F(x)$ based at $b = 0$.

   (b) Give the interval of convergence.

   (c) Find $F^{(10)}(0)$.

(III) Winter 2016 - Final

7. Consider $f(x) = \ln(1 + 3x) + xe^{-2x} - \dfrac{4x}{1 + 5x}$.

   (a) Find the Taylor series for $f(x)$ based at $b = 0$. Write your answer in sigma notation using one sigma sign.

   (b) Give the interval of convergence.

   (c) Give the third Taylor polynomial, $T_3(x)$, approximation of $F(x) = \int_0^x f(t)\,dt$.

More examples of substituting and finding patterns

(IV) Fall 2017 - Final Exam

8. Let $f(x) = x^4 \arctan(x^3)$

    (a) Find the Taylor series based at $b = 0$.

    (b) Find the interval of convergence.

    (c) Find $f^{(2017)}(0)$.

(IV) Winter 2019 - Final Exam

8. Let $f(x) = \dfrac{x^2}{(1-x)^2}$

    (a) Find the Taylor series based at $b = 0$. Hint: $\dfrac{d}{dx}\left(\dfrac{1}{1-x}\right)$.

    (b) Find $f^{(100)}(0)$.

Even more examples of substituting and finding patterns

(VI) Winter 2015 - Final Exam

8. Let $f(x) = x \arctan(x) - \dfrac{1}{2} \ln \left(1 + x^2\right)$

    (a) Find the Taylor series based at $b = 0$. And give the first three non-zero terms.

    (b) Find the interval of convergence.

(VII) Fall 2014 - Final Exam

8. Let $f(x) = \dfrac{x^2}{x^2 - e^2} + x \sin(\pi x - x)$

    (a) Find the Taylor series based at $b = 0$ and give the interval of convergence.

    (b) Find $f^{(674)}(0)$.