MATH 1110H (Section A) Test

Wednesday, 30 October

Time: 15:00–15:50

Space: TSC 1.22

Instructions

- *Show all your work.* Legibly, please! Simplify where you reasonably can.
- *If you have a question, ask it!*
- Use the back sides of all the pages for rough work or extra space.
- You may use a calculator and (all sides of) an aid sheet.

1. Compute $\dfrac{dy}{dx}$ for any *three* (3) of parts **a**–**f**. *[12 = 3 × 4 each]*

   a. $y = \left(x^2 + 1\right)^{41}$ 　　 **b.** $y = \dfrac{x^2 - 1}{x^2 + 1}$ 　　 **c.** $y = 2^{-x}$

   d. $y = \dfrac{\sin(x)}{\tan(x)}$ 　　 **e.** $y = \cos\left(x^3\right)$ 　　 **f.** $e^{x+y} = 1$

2. Do any *two* (2) of parts **a**–**d**. *[8 = 2 × 4 each]*

   a. Compute $\lim\limits_{t \to 0} \dfrac{\tan(t)}{t}$.

   b. Use the ε–δ definition of limits to verify that $\lim\limits_{x \to 2} (2x - 1) = 3$.

   c. Use the limit definition of the derivative to verify that $\dfrac{d}{dx}(x + 1)^2 = 2(x + 1)$.

   d. Find the equation of the tangent line to $y = e^{2x}$ at $x = 0$.

3. Find the domain and any and all intercepts, asymptotes, intervals of increase and decrease, maximum and minimum points, intervals of curvature, and inflection points of the function $f(x) = \dfrac{1}{\sqrt{x^2 + 1}} = \left(x^2 + 1\right)^{-1/2}$, and sketch its graph. *[10]*

[Total = 30]