Practice Midterm 2 – Math 1181H (Calc I Honors) – Autumn 2018

Be sure to give complete explanations and show all your work. Let me know what you are thinking at every step.

1. (10 points) Compute: $\quad$ (1) $\lim\limits_{x\to 0} \dfrac{tan(3x)}{e^{4x} - 1}$, $\qquad$ (2) $\dfrac{d}{dx} \displaystyle\int_0^{x^5} \dfrac{t\, dt}{\sqrt{1 + t^2}}$.

2. (10 points) Find $c > 0$ so that the area bounded by $y = x^2 - c$ and $y = c - x^2$ equals 9.

3. (10 points) Each plane perpendicular to the x-axis intersects a certain solid in a circular cross section whose diameter lies in the xy-plane and extends from $y = x^2$ to $y = 8 - x^2$. The solid lies between the points of intersection of these curves. Find its volume.

4. (10 points) Find the volume generated by revolving the area bounded by $x = y^2$ and $x = 4$ about: (1) the line $y = 2$, and (2) the line $x = -1$.

5. (10 points) A bag of sand is lifted at the constant rate of 3 ft/s for 10 seconds. At the beginning, the bag contains 100 lb of sand, but the sand leaks out at the rate of 4.5 lb/s. How much work is done in lifting this bag?

6. (10 points) Find the point on the graph of $f(x)$ at which the tangent line passes through the origin for (1) $f(x) = e^{ax}$, and (2) $f(x) = ln(x)$.