HOMEWORK #14 (Exam 2 Review Packet)

Due Wednesday March 29th in Gradescope by 11:59 pm ET

Limit Definition of the Definite Integral

1. Compute $\int_{-1}^{3} 2 - 3x^2 \, dx$ using two different methods:

(a) Fundamental Theorem of Calculus and

(b) Limit Definition.

Differentiation

2. Compute $g''(x)$ where $g(x) = \int_{x}^{7} \sqrt{1 - \cos(2t)} \, dt$

Integration Evaluate each of the following integrals. Simplify if possible.

3. $\int x^7 \left(30 - x^8\right)^6 \, dx$

4. $\int_{\pi}^{3\pi} \cos\left(\frac{x}{6}\right) \, dx$

5. $\int 7\cos(5x) - 5\sin(7x) \, dx$

6. $\int_{0}^{\frac{\pi}{2}} \frac{\sin x}{(7 + \cos x)^2} \, dx$

7. $\int_{4}^{9} \frac{\sqrt{x} - x^2}{x} \, dx$

8. $\int_{2}^{3} \frac{1}{x^2} \sin\left(\frac{\pi}{x}\right) \, dx$

9. $\int \frac{\sqrt{7}}{\sqrt{x}\left(\sqrt{x} + 4\right)^2} \, dx$

10. $\int_{0}^{\frac{\pi}{3}} \tan^3 x \cdot \sec^2 x \, dx$

11. $\int x \left(\sqrt{x^2 + 1} + \frac{1}{\sqrt{x^2 + 1}}\right) \, dx$

12. $\int x(x + 1)^{14} \, dx$

Displacement–Total Distance

13. Suppose that the velocity of a moving particle is $v(t) = t^2 - 11t + 24$ feet per second.

- Sketch both $v(t)$ and $|v(t)|$ and the bounded area(s)
- Write the cases definition for $|v(t)|$.
- Set-up, **but do NOT compute**, the Definite Integrals that compute both the **Displacement** and **Total Distance** it travels between time $t = 0$ and $t = 8$ seconds.

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

Tuesday: 1:00–4:00 pm

7:30–9:00 pm TA Ellerman, SMUDD 204

Wednesday: 1:00-3:00 pm

Thursday: none for Professor

7:30–9:000 pm TA Ellerman, SMUDD 207

Friday: 12:00–2:00 pm

- Check the pacing, and aim to improve the response to the integration technique.