Last Name: _____ First Name: _____ Student-No: _____ Section: _____

Very short answer question

1. $\boxed{\text{1 mark}}$ Evaluate $\displaystyle\int \tan^3 x \sec^{37} x \, dx$.

Answer:

Short answer questions—you must show your work

2. $\boxed{\text{2 marks}}$ Evaluate $\displaystyle\int \frac{\log x}{x^2} \, dx$.

3. $\boxed{\text{2 marks}}$ A 6-meter-long cable of mass 5 kg is used to lift a bucket off the ground. How much work is needed to raise the entire cable to height 6 m? Ignore the weight of the bucket and its contents. Use $g = 9.8$ m/s^2 for the acceleration due to gravity. A calculator-ready answer is acceptable.

Long answer question—you must show your work

4. $\boxed{\text{5 marks}}$ Let $c > 0$ be a constant. Let R be the finite region bounded by the graph of $y = 2 + \sqrt{x}e^{x^2}$, the line $y = 2$, and the line $x = c$. Using vertical slices, find the volume generated when R is rotated about the line $y = 2$.