Name: *Student number:*

1. () Each part of the following question is worth 2 points. NO PARTIAL CREDIT will be given.

(i) $\displaystyle\int \frac{1}{2x} dx =$

(ii) Write out the Midpoint Rule with $n = 4$ to approximate $\displaystyle\int_3^7 e^{x^2} dx$ (you don't need to simplify).

(iii) Find the average value of $f(x) = x^{1/3}$ on the interval $[-\pi/2, \pi/2]$.

(iv) $\displaystyle\int_0^{\pi/4} \sec(t)\tan(t)dt =$

(v) State the Fundamental Theorem of Calculus (as on p. 387).

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Name: *Student number:*

2. () Define $f(x) = \displaystyle\int_{-1}^{x} \sin(t^3)\, dt$.

   (i) Compute $f(-1)$ and $f(1)$. Hint: *Don't* try to compute an antiderivative for $\sin(t^3)$, instead use some other properties of the integral and $\sin(t^3)$.

   (ii) Find the critical point of f on the interval $[-1, 1]$.

   (iii) Argue that f must have an absolute min on the interval $[-1, 1]$ at your critical point (without actually computing the absolute min).

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Name: *Student number:*

3. () Use linear approximation to estimate $\sqrt{26}$. With reference to a graph, explain why your answer is an overestimate.

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4. () Find the volume of the solid obtained by rotating the region bounded by $y = \sqrt{x}$, $y = 1$, $y = 3$, and $x = 1$ about the y-axis.

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5. ()

   (i) Find the point on the line $y = 5 - 3x$ closest to the origin.

   (ii) Sketch a graph which includes the given line and a line segment from the origin to your solution point. What should the angle between the two lines be?

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