Name and Discsussion Section Time:_____

M 408C **Exam 3** **Sample**

1. Find the most general anti-derivatives for the following functions:

(i) $3xe^{4x^2}$ **10 points**

(ii) $x\cos(x^2+2)$ **10 points**

2. Evaluate $\int_e^{e^2} \frac{dx}{x \ln x}$. **20 points**

3. If $1200cm^2$ of material is available to make a box with a square base and open top, find the largest possible volume of the box. **20 points**

4. Find f given that $f''(x) = 1 - 6x + 48x^2$, $f(0) = 1$ and $f'(0) = 2$. **10 points**

5. The velocity function of a particle moving along a line is given by $v(t) = t^2 - 5t + 6$.

(a) Compute the displacement over the time interval $0 \leq t \leq 3$. **6 points**

(b) Compute the total distance travelled over the time interval $0 \leq t \leq 3$. **9 points**

6(a) Show that $t \ln t - t$ is an anti-derivative for $\ln t$. **6 points**

(b)Use part (a) to evaluate $\int_1^{\sqrt{e}} x \ln x^2 \, dx$. (**Hint: Substitution**) **9 points**