5 marks  1. In each box mark $T$ or $F$ if the affirmation is true or false respectively. No justification is needed. Assume all functions below are continuous and that $D$ is a bounded and closed fixed set.

- If $f(x, y) = g(x, y) - h(x, y)$ then
  \[
  \iint_D f(x, y) \, dA = \iint_D g(x, y) \, dA - \iint_D h(x, y) \, dA.
  \]

- If $\iint_D f(x, y) \, dA = \iint_D g(x, y) \, dA$ then $f(x, y) = g(x, y)$ for each $(x, y) \in D$.
- If $\iint_D f(x, y) \, dA \geq 0$ then $f(x, y) \geq 0$ for each $(x, y)$ in $D$.
- If $f(x, y) \geq 0$ in $D$ then $\iint_D f(x, y) \, dA \geq 0$.
- If $\iint_D f(x, y) \, dA \leq 0$ then $f(x, y) \leq 0$ for some $(x, y) \in D$.

5 marks  2. Compute the volume of the solid on the first octant ($x, y, z \geq 0$) bounded by the planes $y = x$, $x = 1$ and $z = x + y$.

5 marks  3. Compute the integral
\[
I = \int_0^1 \int_y^1 e^{x^2} \, dx \, dy
\]
4. Find the area between the curve $r = 2 + \sin(\theta)$ and the circle of radius $r = 3$

5. (Bonus marks) Find the volume enclosed by the cylinders $z = x^2 + y^2$, $y = x^2 + z^2$ and $x = y^2 + z^2$. 
This page has been left blank for your rough work and calculations.