Name: ....

MATH-165   **Puzzle Collection 4 - MAKEUP**

2016 Nov 18 12:10pm-1:00pm

23 12:10pm–Wumaier   24 12:10pm–Njus

25 1:10pm–Wumaier   26 1:10pm–Njus

27 2:10pm–Wumaier   28 2:10pm–Njus

This puzzle collection is closed book and closed notes. No sophisticated calculator is allowed for these puzzles. For full credit show all of your work (legibly!). Every puzzle is worth 10 points (a total of 50 points).
If you do not mark your section correctly, you will get -2 points.

Good luck!

Puzzle 1	Puzzle 2	Puzzle 3	Puzzle 4	Puzzle 5
/10	/10	/10	/10	/10

Total score
/50

1: Use the Fundamental Theorem of Calculus to compute C and $f(4)$, where

$$\int_{\frac{1}{2}}^{x} f(t)\, dt = (C + x) \cdot \sin(\pi x).$$

2:   Evaluate

$$\int_1^{e^{\frac{\pi}{4}}} \frac{2}{t(1+(\ln t)^2)}\, dt$$

Your answer must be in simplest form.

3: Find the area between the curves $y = 2x^2 - x\sin^2 x + 1$ and $y = x^2 + x\cos^2 x + 3$.

4: Given that $P' = t^2 P + \dfrac{t^2}{P^2}$ and $P\big(\sqrt[3]{\ln(2)}\big) = 1$, find a general expression for $P(t)$.

5: Given that $f(x)$ is twice differentiable, $f(4) = 6$, $f'(4) = 1$ and $f''(4) = -1$, determine

$$\lim_{x \to 2} \frac{xf(x+2) - 2f(x^2)}{(x-2)^2}.$$