# M E T U
# Northern Cyprus Campus

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| | **Calculus with Analytic Geometry**<br>**Short Exam 2** | |

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| Code : *Math 119*<br>Acad.Year: *2014-2015*<br>Semester : *Spring*<br>Date : *04.08.2015*<br>Time : *17:45*<br>Duration : *25 minutes* | Last Name:<br>Name: KEY<br>Signature:<br>List No:<br>Student No:<br><br>3 QUESTIONS 2 PAGES<br>TOTAL 20 POINTS |

| 1(6) | 2(8) | 3(6) | | | |
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**Show your work! No calculators! Please draw a box around your answers!**
**Please do not write on your desk!**

1. $(6 \times 1 = 6$ pts.) Determine whether the given statement is true or false.
   Indicate your answers by typing **TRUE** or **FALSE** in the blank space provided before the statement. No explanations required.
   Suppose $f(x)$ and $g(x)$ are continuous functions on the interval $[a, b]$ in parts (a) to (c).

   (a) FALSE $\int_a^b \sqrt{f(x)}\,dx = \sqrt{\int_a^b f(x)dx}$

   (b) TRUE $\int_a^b [f(x) + g(x)]\,dx = \left[\int_a^b f(x)\,dx\right] + \left[\int_a^b g(x)\,dx\right]$

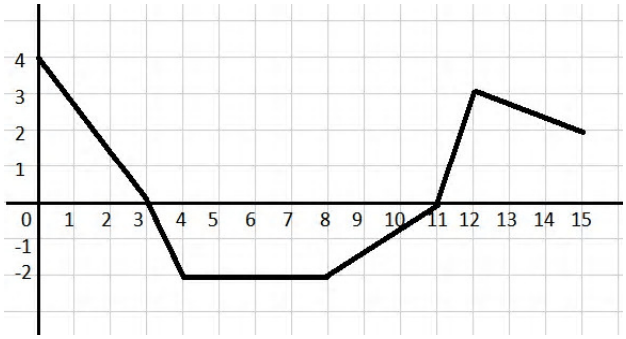
   (c) TRUE The graph of a function **can** intersect its asymptote.

   (d) FALSE $\frac{d}{dx}\int_1^{x^3} \cos(t^2)\,dt = 3x^2\cos(x^6) - \cos(1)$

   (e) TRUE $\int_0^{\pi} \frac{\cos(\sqrt{x})}{\sqrt{x}}\,dx = 2\sin(\sqrt{x})\Big|_{x=0}^{x=\pi} = 2\sin(\sqrt{\pi})$

   (f) FALSE $\frac{d}{dx}\int_a^x \tan(t)\,dt = \sec^2(x)$

2. ($4 \times 2 = 8$ pts.) Answer the following questions using the graph of $f(x)$ below.




(a) $\int_0^3 f(x)\,dx =$ $\frac{1}{2} \cdot 3 \cdot 4 = \boxed{6}$

(b) $\int_3^{11} f(x)\,dx =$ $-\left(\frac{1}{2} \cdot 1 \cdot 2 + 2 \cdot 4 + \frac{1}{2} \cdot 2 \cdot 3\right) = \boxed{-12}$

(c) $\int_{11}^{15} f(x)\,dx =$ $\frac{1}{2} \cdot 1 \cdot 3 + \frac{1}{2} \cdot 1 \cdot 3 + 2 \cdot 6 = \boxed{9}$

(d) Suppose $F(x)$ is an anti-derivative of $f(x)$ such that, $F(0) = 1$. Then, $F(15) =$

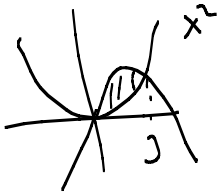
$\int_0^{15} f(x)dx = F(15) - F(0) = 6 - 12 + 9 = 3$

$\Rightarrow F(15) = 3 + F(0) = 3 + 1 = \boxed{4}$

3. (6 pts.) **Evaluate** the area of the finite region enclosed by the curves $y = x^2$ and $y = 6x - x^2$.

$6x - x^2 = x^2 \Rightarrow x(2x - 6) = 0$

$\Rightarrow x = 0$ or $x = 3$




$\text{Area} = \int_0^3 (6x - x^2 - x^2)\,dx = \int_0^3 (6x - 2x^2)\,dx$

$= \left(3x^2 - \frac{2}{3}x^3\right)\Big|_0^3 = 27 - 18 - 0 = \boxed{9}$