# CALCULUS II (Regular)
# FINAL EXAM

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Write only in the answer books provided.  Show all work.  Do not cheat.

#1.    Crunch out these integrals:

a)    $\displaystyle\int_0^3 2x - \frac{1}{x+1}\,dx$        b)    $\displaystyle\int_0^{\pi/2} x^2 \cos x\,dx$

c)    $\displaystyle\int \frac{x^2}{\sqrt{x^3+1}}\,dx$        d)    $\displaystyle\int \sec^5 x \tan x\,dx$

e)    $\displaystyle\int \frac{x+7}{x^2+4x+3}\,dx$        f)    $\displaystyle\int_0^1 \sqrt{1+\sqrt{x}}\,dx$

#2)    Find the average value of  $f(x) = x^2 + 4$  over  $0 \le x \le 5$.

#3)    Find the length of  $f(x) = \dfrac{4}{5}x^{5/4}$  from  $x = 0$  to  $x = 1$.

#4)    Consider the region  $\mathbb{R}$  bounded by  $y = 3x - x^2$  and  $y = 0$.

a)      Find the area of  $\mathbb{R}$.

b)      Find the volume of the solid obtained by rotating  $\mathbb{R}$  around the x-axis.

c)      Find the volume of the solid obtained by rotating  $\mathbb{R}$  around the y-axis.

#5.    Determine whether these series diverge or converge.  Explain carefully.

a)    $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n^3+4}}{n^2+6n}$        (b)    $\displaystyle\sum_{n=1}^{\infty} \frac{n^2+3}{n!}$        (c)    $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$

#6.    Find the exact value of  $\displaystyle\sum_{n=2}^{\infty} \frac{2^n+1}{5^n}$.

#7.    One more integral: $\int \ell n\left(\sqrt{x}-1\right)dx$ .

#8.    Fill in the blank:  An integral $\int\limits_{a}^{b} f(x)dx$  represents an _____

_____.  If  f  is continuous we can use _____

to calculate the integral.  When we do $\int\limits_{a}^{\infty} f(x)dx$  we use _____

between  a  and  $\infty$ , but if we are doing $\sum\limits_{a}^{\infty} f(n)$  we only use_____.

**THE END**