# King Fahd Univ. of Petroleum and Minerals
# Faculty of Sciences
# Department of Mathematical Sciences

FINAL EXAM
(MATH. 102-042 Sections 1 & 2)

**Name:**
**ID:**

**Prob. 1**
Calculate the area between $y = 2x^5 + 3$ and $y = 32x + 3$.

**Prob. 2**

Compute $\int \cos^3 x \sqrt{\csc x} dx$

**Prob. 3**
Compute $\int \frac{dx}{x^2\sqrt{x^2+5}}$

**Prob. 4**

Calculate the length of the arc of the curve $y = \ln x$ between $x = 1$ and $x = \sqrt{3}$.

**Prob. 5**

Find the sum of $\sum_{n=1}^{+\infty} \frac{4}{(4n-3)(4n+1)}$

**Prob. 6**

Determine wether the following series converge or diverge

a) $\sum_{n=2}^{+\infty} \frac{1+n\ln n}{n^2+5}$

b) $\sum_{n=1}^{+\infty} \frac{(2n)!}{n!n!}$

**Prob. 7**

Does the series converge absolutely, converge conditionally or diverge?

$$\sum_{n=1}^{+\infty}(-1)^n(\sqrt{n+1}-\sqrt{n})$$

**Prob. 8**

Find the radius of convergence, for what values of x does the series converge absolutely, converge conditionally?

$$\sum_{n=0}^{+\infty}(-1)^{n+1}\frac{(x+2)^n}{n2^n}$$