## Kingdom of Saudi Arabia

Ministry of Education

Al-Imam Mohammed Ibn Saud Islamic University

- - - College of Science - - -

Department of mathematics & statistics



## التملكة الغربية السفودية وزارة التَّعلِيم جامِعة الإِمَام مُحَمَّد بن سَعُود الإِسلَامِية ---كلِّيـة العُـاوم ---قِسم الرَّيَاضِيَات وَ الاحضاء

## **FINAL EXAMINATION**

| MAT 102  | CALC              | ULU       | 5 2       |           | Sem       | iester 2      | - 2017/2018 (1438/1439 Heg.)            |
|--|-------------------|-----------|-----------|-----------|-----------|---------------|---|
| STUDENT NAME:  |                   |           | STUDE     | ENT ID:   | :         |               | DURATION: 2 HOURS                       |
|  | Question:         | 1         | 2         | 3         | 4         | Total         |   |
|  | Points:           | 12        | 6         | 14        | 8         | 40            |   |
|  | Score:            |           |           |           |           |               |   |
| No calculators allowed. A                                  | nswers wri        | tten      | outsic    | le the    | alloc     | cated sp      | ace will NOT be graded!!!               |
| 1. Evaluate the following (a) $\int_0^1 x \tan^{-1} x  dx$ | ng integral       | S         |           |           |           |               | $(3 \mathrm{pts})$                      |
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|                 | $\int \frac{2}{x^3 + 2x^2 + 2x}  dx$                   |
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| c)              | $\int_{0}^{0} \sqrt{\cos x} \sin^3 x  dx$              |
| c) .            | $\int_{-\pi/3}^{0} \sqrt{\cos x} \sin^3 x  dx \tag{2}$ |
| c) .            | $\int_{-\pi/3}^{0} \sqrt{\cos x} \sin^3 x  dx \tag{2}$ |
| c) .            | $\int_{-\pi/3}^{0} \sqrt{\cos x} \sin^3 x  dx \tag{2}$ |
| c) .            | $\int_{-\pi/3}^{0} \sqrt{\cos x} \sin^3 x  dx \tag{2}$ |
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| $(d) \int \frac{x+2}{\sqrt{4-x^2}}  dx$       | $(2 \mathrm{pts})$   |
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| 2. Determine the convergence or divergence of | $f \int_0^\infty \frac{1}{\sqrt{x} e^{\sqrt{x}}} dx $ (3pts) |
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| 2. 6 points   |        |
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| 1. Let R be the region in the first quadrant bounded by the graphs of $y = x^2$ , $x = 0$ | and    |
| y=2. Compute the volume of the solid formed by revolving R about                          |        |
| (.) $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$   | (3pts) |
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| 4 points                                     |
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| 4 points                                     |
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| 1 points                                     |
| 4 points                                     |
| 4 points                                     |
| (a) $\sum_{k=1}^{\infty} \frac{\cos k}{e^k}$ |
| (a) $\sum_{k=1}^{\infty} \frac{\cos k}{e^k}$ |
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| (b) $\sum_{k=1}^{\infty} \left( \frac{k+10}{2k+1} \right)^{2k} $ (2pts)                                   |
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| $\sim$ $\sim$ $k^{10}$  |
| (c) $\sum_{k=1}^{\infty} \frac{k^{10}}{10^k}$ (2pts)  |
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| 2. Determine the radius and interval of convergence of $\sum_{k=2}^{\infty} \frac{x^k}{4^k \ln k}$ (4pts) |
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| Find the Taylor series for $f(x)=\cos x$ , expanded about $x=\pi/2$ and determine its radius and interval of convergence. |                                      |
|---|--------------------------------------|
| radius and interval of convergence. (4pts   | <br>                                 |
| radius and interval of convergence. (4pts   | <br>                                 |
| adius and interval of convergence. (4pts  | <br>                                 |
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| dius and interval of convergence. (4pts   | <br>                                 |
|   | $x = \pi/2$ and determine its (4pts) |
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|     | onsider the parametric curve given by $x = 2 + 3\cos t$ , $y = 3 + 2\sin t$ | $\sin t$                                |
|-----|---|---|
| (a) | ) Find an x-y equation for the curve.                                       | (2pts                                   |
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