King Fahd University of Petroleum and Minerals
Department of Mathematics Statistics

CODE 004 | **Math 102** | CODE 004

Exam I

Term 111

Tuesday, Oct.11, 2011

Net Time Allowed: 120 minutes

Name: ______________________________

ID: ____________________ Sec: ____________________.

Check that this exam has 20 questions.

Important Instructions:

1. All types of calculators, pagers or mobile phones are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. $\int_0^1 (\sqrt[4]{u}+1)^2 du =$

(a) $\dfrac{39}{15}$

(b) $\dfrac{10}{3}$

(c) $\dfrac{49}{15}$

(d) $\dfrac{8}{3}$

(e) $\dfrac{4}{5}$

2. $\int\limits_{-2\sqrt{5}}^{0} \sqrt{20-x^2}\, dx =$

(a) $\dfrac{5}{4}\pi$

(b) 5π

(c) $\dfrac{\sqrt{5}}{2}\pi$

(d) $2\sqrt{5}\pi$

(e) $\sqrt{20}\pi$

3. The area under the graph of $f(x)=\frac{x}{x+1}$ from $x=0$ to $x=3$ using three rectangles and right endpoints is approximately equal to

(a) $\dfrac{13}{6}$

(b) 2

(c) $\dfrac{3}{5}$

(d) $\dfrac{15}{7}$

(e) $\dfrac{23}{12}$

4. If $\int_{-4}^{7} f(x)dx=A$ and $\int_{7}^{1} f(x)dx=B$, then $\int_{-4}^{1} f(x)dx =$

(a) $A+B$

(b) $A-B$

(c) $7A-4B$

(d) $B-A$

(e) AB

5. $\displaystyle\int \frac{1+\sec^2\theta\tan\theta}{\sec\theta}\,d\theta =$

(a) $\ln|\sec\theta| + C$

(b) $\sin\theta + \frac{1}{3}\sec^3\theta + C$

(c) $\sin\theta + \cos\theta + C$

(d) $\cos\theta + \tan\theta + C$

(e) $\sin\theta + \sec\theta + C$

6. If $H(x) = \displaystyle\int_{\sqrt{x}}^{x^3} e^{t^2}\,dt$, then $H'(1)=$

(a) $\frac{3}{2}e$

(b) $\frac{2}{3}e$

(c) $-\frac{1}{5}e$

(d) 0

(e) $\frac{5}{2}e$

7. $\lim_{n\to\infty} \frac{\pi}{n}(\sin\frac{\pi}{n} + \sin\frac{2\pi}{n} + \sin\frac{3\pi}{n} + \cdots + \sin\frac{n\pi}{n})=$

(a) 1

(b) ∞

(c) 0

(d) 2

(e) $\frac{1}{2}$

8. $\int_0^1 \frac{e^x}{1+e^{2x}}dx =$

(a) $e+1$

(b) $ln(1+e) - ln2$

(c) $2e$

(d) $2\tan^{-1} e - \pi$

(e) $\tan^{-1} e - \frac{\pi}{4}$

9. Let $I = \int_{-1}^{1} \sqrt{2+x^2}\ dx$. Using the comparison properties of the integral,we conclude that

(a) $2\sqrt{2} \leq I \leq 2\sqrt{3}$

(b) $2+\sqrt{2} \leq I \leq 2+\sqrt{3}$

(c) $\sqrt{2} \leq I \leq \sqrt{3}$

(d) $3 \leq I \leq \sqrt{3}$

(e) $2\sqrt{3} \leq I \leq 3$

10. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{t^4 \tan t}{2+\cos t} dt=$

(a) $-\frac{2}{3}$

(b) 0

(c) 8

(d) 2π

(e) $ln3$

11. The area of the region enclosed by the line $2x + y = 1$ and the parabola $y = 4 - x^2$ is equal to

(a) $\frac{37}{9}$

(b) $\frac{32}{3}$

(c) $\frac{15}{4}$

(d) $\frac{31}{13}$

(e) $\frac{33}{5}$

12. $\sum_{i=1}^{n} \frac{(2-i)^2}{n} =$

(a) $3n^2 + 10n + 12$

(b) $2n^2 + n + 14$

(c) $\frac{1}{6}(2n^2 - 9n + 13)$

(d) $\frac{1}{2}(2n^2 - 9n + 7)$

(e) $\frac{1}{3}(n^2 - 7n + 10)$

13. The area of the region lying between the curves $y = x^3$ and $y = x$ from $x = -3$ to $x = 2$ is equal to

(a) $\frac{75}{4}$

(b) $\frac{83}{4}$

(c) $\frac{55}{4}$

(d) $\frac{63}{4}$

(e) $\frac{-55}{4}$

14. If $F(x) = e^{-x^2} - 5 + \int_0^{\sqrt{x}} 8te^{-t^4}\,dt$, then $F'(x)=0$ when

(a) $x = 16$

(b) $x = 0$

(c) $x = 1$

(d) $x = 2$

(e) $x = -\frac{1}{2}$

15. $\int \frac{x^2}{\sqrt{1-x}} dx =$

(a) $4\sqrt{1-x} - \frac{2}{3}(1-x)^{2/3} + 5(1-x)^{1/5} + C$

(b) $-2\sqrt{1-x} - \sqrt{(1-x)^3} + 5\sqrt{(1-x)^5} + C$

(c) $-2\sqrt{1-x} + \frac{4}{3}\sqrt{(1-x)^3} - \frac{2}{5}\sqrt{(1-x)^5} + C$

(d) $\frac{-2}{3}x^3\sqrt{1-x} + C$

(e) $-2 + 2x + 4(1-x)^{1/5} + C$

16. If f is continuous and $\int_0^6 f(2x)dx = 10$, then $\int_0^{2\sqrt{3}} xf(x^2)dx =$

(a) 3

(b) $\frac{5}{3}$

(c) $5\sqrt{3}$

(d) 10

(e) 5

17. $\int_0^{\pi/12} \frac{\sin(6x)}{1+\cos^2(3x)} dx =$

(a) $-\frac{1}{2} ln(1+\sqrt{2})$

(b) $ln 4$

(c) $-\frac{1}{3} ln(\frac{3}{4})$

(d) $ln\sqrt{2}$

(e) $\frac{1}{3} ln 3$

18. The volume of the solid generated by rotating the region enclosed by the curves$y = \sqrt{x}$ and $y = \frac{1}{3}x$ about the line $x = -1$ is given by

(a) $\pi \int_0^3 [(3y)^2 - (y^2)^2] dy$

(b) $\pi \int_0^3 [(3y-1)^2 - (y^2-1)^2] dy$

(c) $\pi \int_0^3 [(3y+1)^2 - (y^2+1)^2] dy$

(d) $\pi \int_0^9 [(\sqrt{x}+1)^2 - (\frac{1}{3}x+1)^2] dx$

(e) $\pi \int_0^9 [(\sqrt{x})^2 - (\frac{1}{3}x)^2] dx$

19. The volume of the solid generated by revolving the region enclosed by the curves $y = \tan x, y = 1, x = 0$ about the x-axis is

(a) 4π

(b) $\frac{3\pi}{2} - 1$

(c) $\frac{\pi}{3} - 2$

(d) $\pi(\frac{\pi}{2} - 1)$

(e) $\pi(\pi + 2)$

20. If the velocity (m/s) of a particle moving in a straight line is given by $v(t) = 1 - 2\sin t,\ \ t \geq 0$ then the distance (m) traveled during the time interval $[0, \frac{\pi}{2}]$ is

(a) $\sqrt{3} - 1 - \frac{\pi}{12}$

(b) $\sqrt{3} - \frac{\pi}{4}$

(c) $2 + \frac{\pi}{12}$

(d) $2 - \frac{\pi}{6}$

(e) $2\sqrt{3} - 2 - \frac{\pi}{6}$