King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 102(39) Class Test I spring 2018(172)

ID#:_____ NAME:_____

1. Express $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} (1+\cos x)\,dx$ as a limit of Riemann sums. Do not evaluate the limit.

2. Use four rectangles to estimate the area under the curve of $f(x) = 4 - x^2$ on $[-2, 2]$ by using midpoints.

3. Express the sums $\sum_{i=1}^{n-1} \frac{i^3}{n^2}$ in closed form.

4. Evaluate each of the following integrals:

(a) $\displaystyle\int_0^{\pi/2} \frac{dx}{1+\tan^2 x}$.

(b) $\displaystyle\int_0^2 4 \mid 2x-1 \mid \, dx$.

(c) $\displaystyle\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{dx}{\sqrt{1-\cos^2 x}}$.

(d) $\displaystyle\int_{-1}^{0} \frac{dx}{x^2+2x+2}$.

(e) $\displaystyle\int \frac{dx}{\sqrt{x}(1+\sqrt{x})}$.

(f) $\displaystyle\int \frac{\sec^2 x\, dx}{\tan x\sqrt{\tan^4 x - 1}}$.

(g) $\displaystyle\int_e^{e^2} \frac{dx}{x \ln x}$.

(h) $\displaystyle\int \sqrt{1+\tan x}(1+\tan^2 x)\, dx$.

(i) $\displaystyle\int \frac{x+1}{\sqrt{4-x^2}}\, dx$.

5. Find $\dfrac{d}{dx}\displaystyle\int_{\sqrt{3}}^{2} \frac{\sqrt{x^2-3}}{x}\,dx$.

6. Find the area bounded by the curve $y = \tan x$, the x-axis, $x = -\dfrac{\pi}{3}$, and $x = \dfrac{\pi}{3}$.

7. Set up an integral that can be used to find the area bounded by the graphs of $x = y^2 - y$ and $x = y - y^2$.

8. Set up an integral that can be used to find the area bounded by the x-axis, the curve $y = \dfrac{1}{\sqrt{3x+1}}$, and the lines $x = 0$, $x = 5$.

9. If the area bounded by the graph of $y = f(x)$, $a \leq x \leq b$, and the x-axis is equal to $b^2(b-a)$, then $f(x)$ is equal to:

10. Find the slope of the tangent to the curve $y = \displaystyle\int_0^{\sqrt{x}} e^{-t^2}\, dt$, $(x > 0)$ at $x = 4$.

11. The base of a solid is a circle of radius 4 and center at the origin. If every cross section perpendicular to the y-axis is a square, then find the volume of the solid.

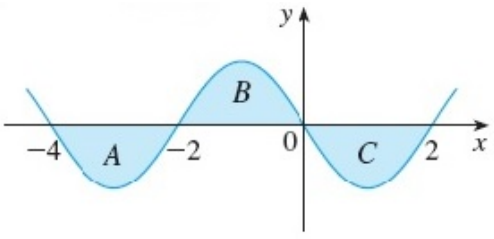
12. Set up the volume generated by rotating the region bounded by $y = x^4$, $x = 1$, and the x-axis about the y-axis.

13. Find the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 0$, and $x = 1$ about the line $x = 2$.

14. Find the volume of the solid obtained by rotating the region bounded by $y = \dfrac{1}{x^{2/5}}$ and the x-axis, $1 \leq x \leq 2$, about the x-axis.

15. Set up the volume generated by rotating the region bounded by $x = y^2$ and $x - y = 2$ about the line $x = 4$.

16. Each of the regions A, B, and C bounded by the graph of f and the x-axis has area equal to 3. Find the value of $\displaystyle\int_{-4}^{2} [f(x) + 2x + 3]\, dx$.



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