King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Exam II Math 102 (Sections 11 and 15)
Semester II, 2005–2006 (052)

Name: _____

ID #: _____ Sec. #: _____

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1. If an integral is a rational expression in $\sin x$, prove that $\sin x = \dfrac{2u}{1+u^2}$ if $\tan \dfrac{x}{2} = u$. (2 points)

2. Evaluate $\displaystyle\int \frac{dx}{\sqrt{x^2+1}}$. (2 points)

3. Set up partial fraction decomposition of $\dfrac{x^2+x-16}{(x+1)^2(x^2+3)}$. (2 points)

4. Find the area of the region bounded by the graph of $y = \sinh 3x$, $y = 0$ and $x = 1$. (2 points)

Please write your answer in the box below for questions 5 to 11.

5	6	7	8	9	10	11

5. The volume of the region bounded by $y = x^3$, $y = 0$ and $x = 1$ is revolved about the line $x = 2$ is equal to (3 points)

(a) π^3

(b) π

(c) $\sqrt{3}$

(d) $\dfrac{3\pi}{5}$

(e) $\sqrt{5}\pi$

6. $\displaystyle\int_0^{1/4} \sec \pi\, x \tan \pi\, x \; dx$ is equal to (3 points)

(a) $\dfrac{\sqrt{2}}{\pi}$

(b) $\dfrac{1}{\pi}(1 - \sqrt{2})$

(c) $\dfrac{1}{\pi}(\sqrt{2} - 1)$

(d) $\dfrac{1}{\pi}(1 + \sqrt{2})$

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

7. $\int_0^{\pi} (x + x\cos x)\, dx$ is equal to (3 points)

(a) $\frac{\pi^2}{2}$

(b) $\frac{\pi^2}{2} - 2$

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

(d) $\pi + \ln 2$

(e) $\frac{\pi^2}{3}$

8. $\int_0^{1} x \ln x\, dx$ is equal to (3 points)

(a) $\frac{-1}{4}$

(b) $\frac{1}{4}$

(c) $\frac{-1}{2}$

(d) $\frac{3}{2}$

(e) $\ln 2$

9. The area of the surface generated by revolving $y = 2\sqrt{1-x}$ between $x = -1$ and $x = 0$ about the x-axis is equal to (3 points)

(a) $\dfrac{4\pi}{3}(3\sqrt{3}-2)$

(b) $\dfrac{8\pi}{3}(3-2\sqrt{3})$

(c) $\dfrac{8\pi}{3}(3\sqrt{3}+2\sqrt{2})$

(d) $\dfrac{8\pi}{5}\ln 7$

(e) $\dfrac{8\pi}{3}(3\sqrt{3}-2\sqrt{2})$

10. $\displaystyle\int_{-\infty}^{+\infty} \operatorname{sech} x\, dx$ is equal to (3 points)

(a) -3π

(b) $-\pi$

(c) π

(d) $\dfrac{3\pi}{2}$

(e) $\dfrac{\pi}{2}$

11. $\int_0^{\pi/4} \cos^3 x \, dx$ is equal to (3 points)

(a) $\dfrac{5\sqrt{2}}{12}$

(b) $\dfrac{5}{3\sqrt{2}}$

(c) $\dfrac{\sqrt{2}}{12}$

(d) $-\dfrac{1}{6\sqrt{2}}$

(e) $\dfrac{1}{\sqrt{2}} + 1$