CALCULUS II – Worksheet #3 **TEST TOMORROW!!!!!**

1. $\int \frac{5x^2 - x + 2}{x(x^2 + 1)}\, dx =$ **$2\ln|x| + \frac{3}{2}\ln(x^2 + 1) - \tan^{-1}x + C$**

2. $\int \frac{3x^2 + x + 2}{x^3 - x}\, dx =$ **$-2\ln|x| + 2\ln|x + 1| + 3\ln|x - 1| + C$**

3. $\int \frac{dx}{1 + 4x^2} =$ A) $\tan^{-1}(2x) + C$ B) $\frac{1}{8}\ln(1 + 4x^2) + C$ C) $\frac{1}{8(1 + 4x^2)^2} + C$
•D) $\frac{1}{2}\tan^{-1}(2x) + C$ E) $\frac{1}{8x}\ln|1 + 4x^2| + C$

4. $\int_1^e x \ln x\, dx =$
(A) e (B) $\frac{1}{2}(e^2 - 1)$ •(C) $\frac{1}{4}(e^2 + 1)$ (D) $\frac{1}{2}(e - 1)$ (E) none of these

5. $\int \cos^2 2x\, dx =$ •A) $\frac{x}{2} + \frac{\sin 4x}{8} + C$ B) $\frac{x}{2} - \frac{\sin 4x}{8} + C$ C) $\frac{x}{4} + \frac{\sin 4x}{4} + C$ D) $\frac{x}{4} + \frac{\sin 4x}{16} + C$
E) $\frac{1}{4}(x + \sin 4x) + C$

6. $\int \tan^{-1}x\, dx =$ (A) $\tan^{-1}x + \ln(1 + x^2) + C$ (B) $x\tan^{-1}x + C$ (C) $\frac{1}{1 + x^2} + C$
•(D) $x\tan^{-1}x - \frac{1}{2}\ln(1 + x^2) + C$ (E) $\ln(1 + x^2) + x\tan^{-1}x + C$

7. $\int_0^1 x^2 e^x\, dx =$ (A) $-3e - 1$ (B) $-e$ •(C) $e - 2$ (D) $3e$ (E) $4e - 1$

8. If $x = e^t$ and $y = 2e^{-t}$, then the **equation** of the tangent to the curve at $t = 0$ is
(A) $2x + y = 0$ (B) $x + 2y = 5$ (C) $y = -2x + 5$ •(D) $2x + y = 4$ (E) $y = 2x$

9. Find $\frac{d^2y}{dx^2}$ if $x = t - t^2$ and $y = t^2 - 1$. **$\frac{2}{(1 - 2t)^3}$**

10. Solve the following differential equation: $\frac{dy}{dx} = \frac{3x\sqrt{1 + y^2}}{y}$
$2\sqrt{1 + y^2} = 3x^2 + C$ or $\sqrt{1 + y^2} = \frac{3}{2}x^2 + C$

11. $\int \frac{x\, dx}{x + 3} =$ (A) $\frac{1}{2}(x + 3)^{-1/2} + C$ (B) $\ln|x + 3| + C$ (C) $x - \ln|x + 3| + C$
•(D) $x - 3\ln|x + 3| + C$ (E) none of these

12. If $\frac{dy}{dx} = 6x$ and $y = e^4$ when $x = 3$, then $y =$
(A) $2x^3 + e^4$ (B) $e^4 - 19$ (C) $6 + e^4 - x$ (D) $6x + e^4 - 27$ •(E) $3x^2 + e^4 - 27$