MATH 151
Mrs. Bonny Tighe

QUIZ 9
25 points
5.3,5.4,5.5

NAME Answer

SECTION__________ Fri 4/28/06

1. Use the Fundamental Theorem of Calculus Part I to find the derivative of each of the following:

a) $\int_x^2 \cos m\sqrt{1+\sin m}\ dm =$ ________

$-\cos x\sqrt{1+\sin x}$

b) $\int_1^{\cos x} (t^3 - 2t + 1)dt =$ ____________

$(\cos^3 x - 2\cos x + 1)(-\sin x)$

2. Use Part 2 of the Fundamental Theorem of Calculus to evaluate the integral, or explain why it doesn't exist.

a) $\int_1^3 \sqrt{x}(2x-1)dx =$ _______

$\int_1^3 (2x^{3/2} - 1)\,dx = 2\cdot\frac{1}{5/2}x^{5/2} - x\Big|_1^3$

$\left(\frac{4}{5}(3)^{5/2} - 3\right) - \left(\frac{4}{5}(1)^{5/2} - 1\right)$

$\frac{4}{5}(3)^{5/2} - 3 - \frac{4}{5} + 1 = \frac{4}{5}(3)^{5/2} - \frac{14}{5}$

b) $\int_0^{\pi/4} \sec^2 x\ dx =$ 1

$\tan x\Big|_0^{\pi/4} =$

$\tan\pi/4 - \tan 0 = 1$

3. Find the general indefinite integral.

a) $\int(x^2\sqrt{x} + \frac{2}{x^3})\ dx =$ _______

$x^{5/2} \quad +2x^{-3}$

$\frac{1}{7/2}x^{7/2} + \frac{2}{-2}x^{-2} + C$

$\frac{2}{7}x^{7/2} - \frac{1}{x^2} + C$

b) $\int(x^2 + x)^2 dx =$ _________

$\int(x^4 + 2x^3 + x)\,dx =$

$\frac{1}{5}x^5 + \frac{2}{4}x^4 + \frac{1}{2}x^2 + C$

$\frac{1}{5}x^5 + \frac{1}{2}x^4 + \frac{1}{2}x^2 + C$

c) $\int\frac{\sin 2\phi}{\sin\phi}\ d\phi = 2\sin\phi + C$

$\int\frac{2\cancel{\sin\phi}\cos\phi}{\cancel{\sin\phi}}\,d\phi$

$\int 2\cos\phi\ d\phi =$

d) $\int\sec A\tan A\,dA =$ $\sec A + C$

a) $\int_0^4 (t^2+5t+6)\,dt = \frac{1}{3}t^3 + \frac{5}{2}t^2 + 6t\Big|_0^4 = \left(\frac{64}{3} + \frac{5}{2}(16) - 24\right) - 0$

$\frac{64}{3} + 40 - 24 = 21\frac{1}{3} + 16$

4. The velocity function, in meters per second, is given for a particle moving along a line. Find the a) displacement and b) the total distance traveled by the particle during the given time interval. $v(t) = t^2 + 5t - 6, \quad 0 \le t \le 4$

$37\frac{1}{3}$ m

$37\frac{1}{3}$ m

$v(t) = 0 \quad (t+6)(t-1) = 0 \quad$ at $t = 1$ sec

$\frac{1}{3}t^3 + \frac{5}{2}t^2 - 6t\Big|_0^1 + \frac{1}{3}t^3 + \frac{5}{2}t^2 - 6t\Big|_1^4$

$\left(\frac{1}{3} + \frac{5}{2} - 6\right) - 0 + (\;) - \left(\frac{1}{3} + \frac{5}{2} - 6\right)$

$\left(\frac{17}{6} - 6\right) + 37\frac{1}{3} - \left(\frac{17}{6} - 6\right)$

$\left|\frac{-19}{6}\right| + 37\frac{1}{3} + \frac{19}{6} = \frac{19}{3} + 37\frac{1}{3} = 6\frac{1}{3} + 37\frac{1}{3}$ $\quad$ $43\frac{1}{3}$ m

5. Evaluate the integral, if it exists, using substitution.

a) $\int \frac{x^2}{(4-x)^3}\,dx =$ ____________

$\int u^{-3}\,du$

b) $\int \sec^6\alpha \tan\alpha \, d\alpha =$ ____________

$\int \sec^5\alpha \sec\alpha\tan\alpha\,d\alpha$

$\frac{1}{6}\sec^6 + C$

c) $\int_0^{\pi/6} \cos 3x \, dx = \frac{1}{3}$

$\frac{1}{3}\sin 3x\Big|_0^{\pi/6} =$

$\frac{1}{3}\sin\frac{\pi}{2} - \frac{1}{3}\sin 0 = \frac{1}{3}$

d) $\int x\sin(x^2+3)\,dx = -\frac{1}{2}\cos(x^2+3) + C$

$\frac{1}{2}\int \sin u\,du$

$u = x^2+3$

$du = 2x\,dx$

e) $\int \csc^2(\sin x)\cos x\,dx =$ ______

$\int \csc^2 u\,du \quad u = \sin x$

$du = \cos x\,dx$

$-\cot(\sin x) + C$

f) $\int \cos x \sin^5 x\,dx = \frac{1}{6}\sin^6 x + C$

$\int u^5\,du$

$u = \sin x$

$du = \cos x\,dx$