MATH 238 **QUIZ#5 (CH.14&15)** **SPRING 2014** **NAME:** Key

1. $(5\,pts)$ Find the area bounded by the graphs of the indicated equations over the given interval $y = x^2 + 1; y = 2x - 2; -1 \le x \le 2$

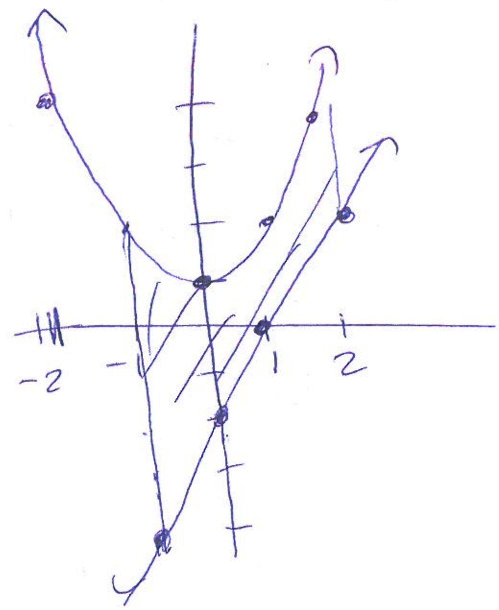
$$A = \int_{-1}^{2} (x^2+1) - (2x-2)\,dx$$

$$= \int_{-1}^{2} (x^2 - 2x + 3)\,dx$$

$$= \frac{x^3}{3} - x^2 + 3x \Big|_{-1}^{2}$$

$$= \frac{8}{3} - 4 + 6 - \left(-\frac{1}{3} - 1 - 3\right)$$

$$= 3 + 2 + 4 = \boxed{9}$$



2. $(5\,pts)$ Integrate: $\int x^2 \ln x\,dx$

$u = \ln x \quad dv = x^2 dx$

$du = \frac{1}{x} dx \quad v = \frac{x^3}{3}$

$$= \frac{x^3}{3} \ln x - \int \frac{x^3}{3} \cdot \frac{1}{x}\,dx$$

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

$$= \boxed{\frac{x^3}{3} \ln x - \frac{x^3}{9} + C}$$

3. $(5\,pts)$ Find the indefinite integral: $\int (6x^2 + 3x - 5)^3 (12x + 3)\,dx$

$u = 6x^2 + 3x - 5$

$du = (12x+3)\,dx$

$$= \int u^3\,du$$

$$= \frac{u^4}{4} + C$$

$$= \frac{(6x^2+3x-5)^4}{4} + C$$

$u = x$
$a = 3 \quad b = 1$

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4. $(5\,pts)$ Use Table II to find the integral: $\int_1^3 \frac{x^2}{3+x}\,dx$

$\int \frac{u^2}{a+bu}\,du$

$= \frac{(3+x)^2}{2} - \frac{6(3+x)}{1} + \frac{9}{1}\ln|3+x| \Big|_1^3$

$= \frac{36}{2} - 6(6) + 9\ln|6| - \left[\frac{16}{2} - 24 + 9\ln|4|\right]$

$= 18 - 36 + 9\ln 6 - (8 - 24 + 9\ln 4)$

$= -2 + 9\ln 6 - 9\ln 4 = \cancel{2 + 9(\ln 6 + \ln 4)}$

$= 1.6492$

5. $(5\,pts)$ Find $f_y(x,y)$ if $f(x,y) = x^2 - 3xy + 2y^2$

$f_y(x,y) = -3x + 4y$