Math 1272 Quiz 2

February 6, 2014
Name: SOLUTIONS

Time allowed: 20 minutes. Good luck!

1. (*35 %*) Evaluate

$$\int \frac{\sqrt{25x^2-4}}{x}\,dx$$

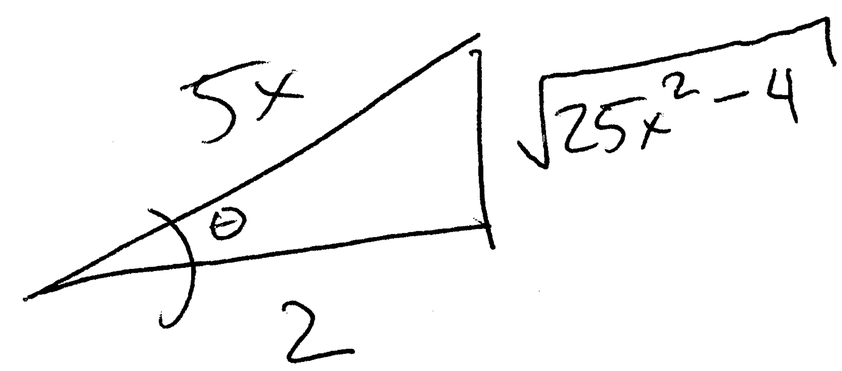
$5x = 2\sec\theta$

$5\,dx = 2\sec\theta\tan\theta\,d\theta$

$$= \int \frac{\sqrt{25\overset{\sec^2\theta}{} - 4}}{\frac{2}{5}\cancel{\sec\theta}} \cdot \frac{2}{5}\cancel{\sec\theta}\tan\theta\,d\theta$$

$$= \int \sqrt{4(\sec^2\theta - 1)} \cdot \tan\theta\,d\theta$$

$$= 2\int \tan^2\theta\,d\theta$$



$$= 2\int (\sec^2\theta - 1)\,d\theta$$

$$= 2\left[\tan\theta - \theta\right] + C$$

$$= 2\left[\frac{\sqrt{25x^2-4}}{2} - \sec^{-1}\left(\frac{5x}{2}\right)\right] + C$$

2. (*15%*) The partial fraction decomposition for

$$\frac{x+1}{(x^4+10x^2+25)(x-7)}$$

is

a) $\frac{A}{x^4+10x^2+25} + \frac{B}{x-7}$

b) $\frac{Ax+B}{(x^2+5)^2} + \frac{C}{x-7}$

c) $\frac{A+Bx+Cx^2+Dx^3}{x^4+10x^2+25} + \frac{E}{x-7}$

d) $\frac{Ax+B}{x^2+5} + \frac{Cx+D}{(x^2+5)^2} + \frac{E}{x-7}$

e) None of the above.

3. (*35 %*) Evaluate

$$\int \frac{x+9}{x^2-3x-10}dx.$$

$$\frac{x+9}{x^2-3x-10} = \frac{x+9}{(x-5)(x+2)} = \frac{A}{\cancel{x}-5} + \frac{B}{x+2}$$

$x: A + B = 1$

$k: +2A - 5B = 9$

$A = 2, \; B = -1$

$$= \int \frac{2}{x-5}dx - \int \frac{dx}{x+2}$$

$$= 2\ln|x-5| - \ln|x+2| + C$$

4. (*15 %*) Write the trig substitution you should use for each of the following integrals. Your answer should look like $x = \ldots$.

a) $\int \sqrt{x^2+49}dx$ $\quad x = 7\tan\theta$

b) $\int \frac{dx}{x\sqrt{3-x^2}}dx$ $\quad x = \sqrt{3}\sin\theta$

c) $\int x^2\sqrt{r^2-(sx)^2}dx$ $\quad sx = r\sin\theta$