Math 172 Quiz 4 **Name:** _____

Sections: 7.1-7.6 Point values in $\boxed{\text{boxes}}$.

5 October 2018

1. $\boxed{5}$ Evaluate.

$$\int \frac{x+2}{x(x^2+1)}\,dx$$

$$\frac{x+2}{x(x^2+1)} = \frac{A}{x} + \frac{Bx+C}{x^2+1}$$

$$x+2 = A(x^2+1) + (Bx+C)x$$

$x=0$: $2 = A$

<u>Eq. Coeff</u>:

x^2 : $0 = A+B$ so $B=-2$

x : $1 = C$

so $$\int \frac{x+2}{x(x^2+1)}\,dx = \int \left(\frac{2}{x} - \frac{2x}{x^2+1} + \frac{1}{x^2+1} \right) dx$$

$$= 2\ln|x| - \ln(x^2+1) + \arctan x + C$$

2. $\boxed{3}$ Evaluate.

$$\int \frac{2x+3}{x^2+2x+5}\,dx$$

$$= \int \frac{2x+2}{x^2+2x+5}\,dx + \int \frac{1}{(x+1)^2+2^2}\,dx$$

$$= \ln\left(x^2+2x+5\right) + \frac{1}{2}\arctan\left(\frac{x+1}{2}\right) + C$$

3. $\boxed{2}$ The following integral can be evaluated with a trigonometric substitution. Specify an appropriate substitution, both x and dx. However, it should not be evaluated in that way. Instead, choose a different method to evaluate the integral[1].

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

$x =$ $2\sin\theta$, so $dx =$ $2\cos\theta\, d\theta$.

$u = 4 - x^2$

$du = -2x\,dx$

$$= \int -u^{-3/2}\,du = 2u^{-1/2} + C = \frac{2}{\sqrt{4-x^2}} + C$$

[1] I hope you didn't get a 'Trig Sub ♡ 4 Life' tattoo over the weekend; it isn't always the best way to evaluate integrals.