

Name \_\_\_\_\_

*Justify all answers by showing your work or by providing a coherent explanation. All answers must be exact. Please circle your answers.*

- Find an antiderivative of  $\frac{x+2}{x^2+3}$ .
- Find an antiderivative of  $\frac{2}{x-3\sqrt{x+10}}$ .
- Find an antiderivative of  $\frac{5x^2-3}{x^3-x}$ .
- Find  $y(x)$  in order that  $\frac{dy}{dx} + yx^2 = 0$ ,  $y=0$  when  $x=1$ .
- Find the area under the curve  $\frac{x^3}{x^2-1}$  from  $x=2$  to  $x=4$ .
- Evaluate the indefinite integral of  $\frac{1}{2x^2-3x+2}$ .
- Solve the following differential equation for  $y$ :  $\frac{dy}{dx} = \frac{y}{x^2+4}$ .
- Solve the following differential equation for  $y$ :  $y \tan x \, dx + \cos^2 x \, dy = 0$ .
- Find an antiderivative of  $x \sec^2 x$ .
- A particle moves such that the velocity  $v$  is given by  $v = t\sqrt{t+1}$ . Find the expression for the displacement  $s$  as a function of the time if  $s=0$  when  $t=0$ .
- Find the definite integral of  $xe^{6x^2}$  from  $x=0$  to  $x=1$ .
- Use integration by parts to find the antiderivative of  $y = \arcsin x$ .