Take Home Quiz #1 - Chapter 5,6: Math 132

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Make sure you show all work. No credit will be given for answers with no justification. Please circle/box final answers and label problems clearly. Please be neat! Good luck! :)

1. Compute the following integrals.
   (a) (4 points) $\int_0^1 \frac{x^2+4x}{x^3+6x^2+5}dx$
   (b) (3 points) $\int \frac{(\ln x)^2}{4x}dx$
2. Compute the following integrals.
   (a) (4 points) $\int \frac{x^4+x+3}{x}dx$
   (b) (3 points) $\int \frac{x^2+2x+1}{x^2-1}dx$
3. Compute the following trig integrals.
   (a) (3 points) $\int \frac{\cos t}{1+\sin t}dt$
   (b) (4 points) $\int_{-\pi}^{\pi} \frac{\csc^2 t}{\cot^3 t}dt$
4. Compute the following inverse trig integrals.
   (a) (3 points) $\int \frac{3dx}{x\sqrt{x^2-4}}$
   (b) (4 points) $\int \frac{2}{x^2+6x+13}dx$
5. **(a) (4 points)** Verify that the solution to the differential equation $y' = -2xy$ is $y(x) = Ce^{-x^2}$. Find the particular solution if $y(0) = 4$.
   (b) (4 points) Draw the slope field for this differential equation.

6. **(7 points)** Use Euler's method with three iterations to find an approximation to the solution of $y' = \frac{2x}{y}$ with the initial condition $(0, 2)$ and $h = 0.1$.

7. **(7 points)** The rate of change of y is proportional to $(x + 3)y$. The equation for this is

$$\frac{dy}{dx} = k(x + 3)y$$

Solve this equation using separation of variables. When $x = 0$, $y = 100$. When $x = 1$, $y = 400$. What is the value of y when $x = 2$?