Group work 5
Due 3/8/2019

Name: ________________________________

Instructions: Show your work. Circle your final answers. The assignment has 6 pages.

1. Find the following integrals:
   (a) \[ \int \frac{1}{1 - x^2} \, dx \]
      Hint: use partial fraction decomposition.
   (b) \[ \int \frac{1}{\cos x} \, dx \]
      Hint: use substitution \( u = \sin x \).
(c) \[ \int \sqrt{1 + x^2} \, dx \]

Hint: use substitution \( x = \tan u \).

(d) \[ \int_{0}^{\pi/2} x \cos 2x \, dx \]

Hint: use integration by parts.
(e) \[
\int_{0}^{3} \frac{x}{\sqrt{x+1}} \, dx
\]
Hint: use either substitution or integration by parts.

(f) \[
\int e^x \cos^2 x \, dx
\]
Hint: use the identity \( \cos 2x = 2 \cos^2 x - 1 \).
(g) 

\[ \int_{0}^{\pi} e^{x} \cos 2xdx \]

Hint: use integration by parts twice.
(h) \[
\int \frac{x^4}{x^3 - 2x^2 + x} \, dx
\]

Hint: first do long division, then use partial fraction decomposition.
2. Compute the volume of the unit sphere (i.e. sphere with radius 1). Hint: the sphere is a solid of revolution. You can use either the slicing method or shell method.