PRACTICE EXAM 2 - MATH 152

DATE: Tuesday, October 19 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your

work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. A rocket weighing 3 tons is filled with 40 tons of liquid fuel. In the initial part of the flight, fuel is burned off at a constant rate of 2 tons per 1000 feet of vertical height. How much work is done in lifting the rocket to 3000 feet?
- 2. An oil tank is shaped like a right circular cylinder of diameter 4 feet. Find the total fluid force against one end when the axis is horizontal and the tank is filled with oil of weight density 50lb/ft^3 .
- 3. Show that $\tanh^{-1} x = \frac{1}{2} \ln \left(\frac{1+x}{1-x} \right), -1 < x < 1$. Then use the formula to obtain a formula for the derivative of $\tanh^{-1} x$.
- 4. Compute the integrals
 - (a) $\int x e^{-7x} dx$
 - (b) $\int x^2 \sin x dx$
- 5. Compute the integrals
 - (a) $\int \sin^4 (3x) \cos (3x) dx$
 - (b) $\int_{-\pi}^{\pi} \cos^2{(5x)} dx$
- 6. Compute the integral $\int \frac{x^3+x^2+x+2}{(x^2+1)(x^2+2)} dx$.