CALCULUS II EXAM 2 **NAME** _____

1. Evaluate each integral.

(a) (8 points) $\int x^5 \ln x \, dx$

(b) (8 points) $\int \sin^3 x \cos^4 x \, dx$

(c) (8 points) $\int \sin^{-1} x \, dx$

(d) (10 points) $\displaystyle\int \frac{1}{x^2\sqrt{x^2-4}}\,dx$

(e) (8 points) $\displaystyle\int \frac{6}{x^2+x-2}\,dx$

(f) (8 points) $\displaystyle\int e^x \cos x\,dx$

2. (6 points) Write out the form of the partial fraction decomposition for $\dfrac{1}{x^2(x^2+2x+1)(x^2+x+1)}$. (Do not find the numerical values of the coefficients)

3. (8 points) Find the exact arc length of the curve $y = \dfrac{x^4}{16} + \dfrac{1}{2x^2}$ from $x = 0$ to 1.

4. (6 points) A spring exerts a force of 8N when it is stretched from its natural length of 2 m to a length of 4 m. Find the work required to stretch the spring from a length of 4 m to a length of 7 m.

5. Set up the integral for the volume of the solid. **Do not evaluate the integrals.**
   (a) (6 points) The base of the solid is the region bounded between the curve $y = \sqrt{x}$ and the x-axis from $x = 2$ to $x = 4$. The cross sections taken perpendicular to the x-axis are **squares**.

   (b) (8 points) The solid is generated when the region enclosed by $y = x^2$, $y = 4$ and $x = 0$ is revolved about $x = 5$. You must use the **disk/washer** method.

   (c) (8 points) The solid is generated when the region enclosed by $y = \sqrt{x}$ and $y = x$ is revolved about $x = -2$. You must use the **cylindrical shell** method.

6. (8 points) The cone-shaped water reservoir is 8 ft in diameter across the top and 10 ft deep. If the reservoir is filled to a depth of 6 feet, how much work is required to pump all the water to the top of the reservoir? The density of the water is 62.4 lb/ft^3. **Set up the integral but do not evaluate it.**