

Name: _____

Please show all work and justify your answers.

1. Evaluate the following integrals (show all steps)

$$(a) \int \frac{dx}{\sqrt{x}(1 + \sqrt{x})^3} \quad (b) \int \tanh\left(\frac{x}{5}\right) dx$$

2. Sketch the solid obtained by revolving the region in the plane enclosed by the curves $y = x^2 + 1$ and $y = x + 3$ about the x axis. Find its volume.
3. Sketch the surface obtained by rotating the curve segment $x = \sin y$, $0 \leq y \leq \pi$ about the y axis. Find its area.
4. Luigi brews up a cup of espresso, which clocks at 90° (Celsius). He gets distracted by a phone call and after two minutes the espresso cools down to 60° . If the room temperature is 20° , how soon does Luigi need to hang up, if he doesn't want to drink tepid 30° espresso?
5. Evaluate the following integrals (show all steps)

$$(a) \int \arctan x dx \quad (\text{Hint: by parts}) \quad (b) \int \frac{x^4 dx}{1 - x^2}$$

1	2	3	4	5	total (50)	%

Prelim. course grade: %