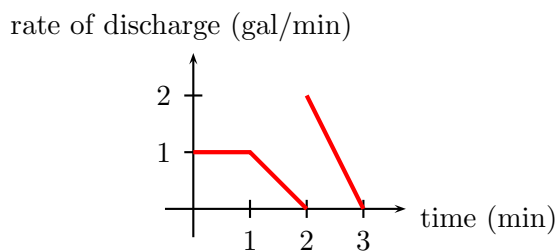Name: _____

Please show all work and justify your statements. Make and label sketches, draw conclusions (using complete sentences and including units), and box the final answers as appropriate.

1. The screen of Wide Axle County Drive-in Movie Theater is 30 meters high and the bottom edge of the screen rises 20 meters above the ground. Use calculus to explain to customer Bob how far from the screen he should sit to enjoy the widest vertical viewing angle.

2. The rate of discharge from a swill tank at the Chemical Rubber Company is graphed below. On a separate graph, make an accurate sketch of the volume of swill in the tank as a function of time, assuming that initially the tank contains 10 gallons of swill.

rate of discharge (gal/min)

3. Evaluate the following integrals analytically. Show all steps.

$$\text{(a)} \ \int_1^4 t^2\sqrt{t}\,dt \qquad \text{(b)} \ \int_{-\frac{\pi}{2}}^{\pi} \cos(5t)\,dt \qquad \text{(c)} \ \int \frac{1+t}{t}\,dt \qquad \text{(d)} \ \int 7^{3t}\,dt$$

4. In an escalating conflict the casualty rate is estimated to be proportional to time from the outset of hostilities. Initially an Army of 100,000 goes into the field. If only 98,000 are expected to remain after a year, how large will the Army likely be five years into the game?

1	2	3	4	total (40)	%

Prelim. course grade: %