Tyler Gillette

Part 2. Follow the instructions in each question. Except where indicated, you are expected to provide a complete solution, including showing/explaining your steps. **Upload these pages to Gradescope.**
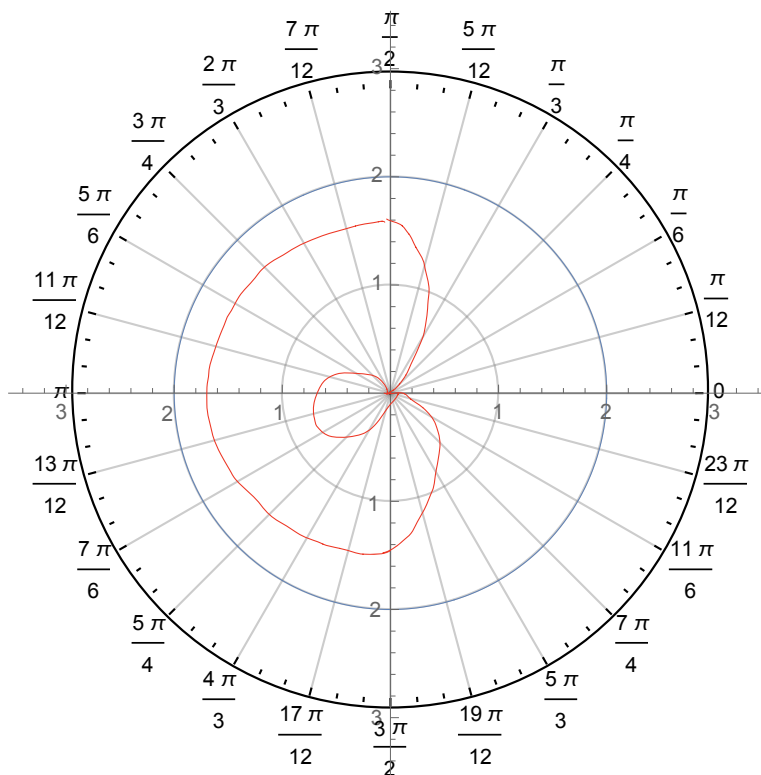
1. (12 points) For the polar curve
$$r = 1 - 2\cos\theta,$$

(a) Fill in the blanks with the correct angles between 0 and 2π: The graph passes through the pole (origin) at
$$\theta = \underline{\quad 0 \quad} \text{ and } \theta = \underline{\quad \frac{\pi}{2} \quad}.$$

(b) On the axes below, sketch a graph of the curve. Label the polar points corresponding to $\theta = 0, \dfrac{\pi}{2}, \pi,$ and $\dfrac{3\pi}{2}.$

2. (9 points) (No work need be shown) Evaluate the integral:

$$\int \frac{5}{3x+1} + \frac{3}{1+4x^2}\ dx = \underline{\hspace{5cm}}.$$

$$\boxed{\frac{5\ln(3x+1)}{3} + \frac{3\,Arctan(2x)}{2}}\ \checkmark$$

3. (12 points) Evaluate the definite integral $\displaystyle\int_0^1 xe^{3x}\ dx$.

$$\int_0^1 xe^{3x}\,dx \qquad U = x \qquad dv = e^{3x} \qquad\qquad \int U\,dv = UV - \int V\,du$$

$$\qquad\qquad\qquad du = 1 \qquad V = \frac{e^{3x}}{3}$$

$$= \frac{xe^{3x}}{3} - \int \frac{e^{3x}}{3}\,dx$$

$$\qquad\qquad\qquad U = 3x \qquad dx = \tfrac{1}{3}dv$$

$$= \frac{xe^{3x}}{3} - \tfrac{1}{9}\int e^v\,dv$$

$$= \frac{xe^{3x}}{3} - \tfrac{1}{9}\left(\frac{e^v}{\ln e}\right)$$

$$= \frac{xe^{3x}}{3} - \frac{e^v}{9}$$

$$\boxed{= \frac{xe^{3x}}{3} - \frac{e^{3x}}{9} + C}\ \checkmark$$

4. (12 points) Consider the parametric equations

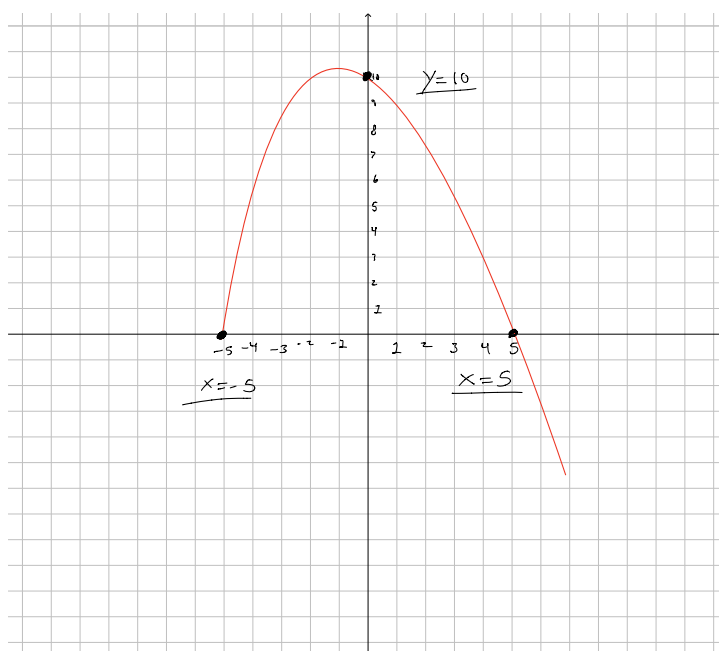$$x = t^2 - 4$$
$$y = t^3 - 9t$$

(a) Find all points $(x, 0)$ where the graph crosses the x-axis.

$$0 = T^3 - 9T \qquad X = 3^2 - 4$$
$$\frac{9T}{T} = \frac{T^3}{T}$$
$$\sqrt{9} = T^2$$
$$T = 3$$
$$T = \emptyset \qquad \boxed{\begin{array}{c} X = -4 \\ X = 5 \end{array}} \checkmark$$

(b) Find all points $(0, y)$ where the graph crosses the y-axis.

$$0 = T^2 - 4 \qquad Y = 2^3 - 9(2)$$
$$T = 2 \qquad Y = 8 - 18$$
$$\boxed{Y = 10} \checkmark$$

(c) On the axes below, sketch a graph of the curve. Label the points found in parts (a) and (b) with their corresponding t-values. Indicate with arrows the direction of increasing t-values.

5. **Reflections.** (6 points) *There are no wrong answers. More detail = more points.*

(a) What was the most challenging question on the exam? What, specifically, was difficult about it?

The Polar coordinate Question in Part 2 was difficut to graph.

Question 13 I couldnt figure out how to do it and ended up going with a guess.

(b) Were the length and format of this exam what you expected? Did any questions surprise you? How?

The exam started out easy and quickly got hard. Question 7, the one about the work done was difficult. I briefly reveiwed that section.

The exam was very long, the multiple choice questions should be faster to do with the addition of the fill in questions at the end. I ended up guessing on quiet a few.

(c) What concepts did you study that you didn't get to use on this exam, if any? What do you want to get credit for knowing but didn't get a chance to show it on the exam?

I went over every home work, in class solution and the labs.
I didnt get to use hydro static force.