Midterm 3 Review Problems **Math 142**

These are suggested review problems similar to what might be on Midterm 3. Included with each problem is a link to a video where you can see how the problem is solved. I didn't make the videos, they are all available online.

1. Find the arc length of the parametric curve with coordinates $x = 2 + 6t^2$ and $y = 5 + 4t^3$ for $0 \leq t \leq \sqrt{8}$.

https://youtu.be/X8N21DrWmjU

2. Suppose that the amount of time x (measured in days) until a light bulb burns out has probability density function $f(x) = \frac{1}{100}e^{-x/100}$, $x \geq 0$. What is the probabilitiy that the light bulb will burn out sometime between 50 and 150 days from now?

https://youtu.be/tOHjArh_WeM

3. What is the average length of time until the light bulb in the previous problem burns out?

https://youtu.be/tOHjArh_WeM

4. Find the centroid of the region between the curves $y = x^2$ and $y = 8 - x^2$. (Recall the centroid is the point with coordinates equal to the average x-value $\bar{x}$ and average y-value $\bar{y}$ for the region).

https://youtu.be/NYUyHj3c1Xg

5. A circular swimming pool is 24 ft. in diameter, the sides are 5 feet high, and the depth of the water is 4 ft. How much work is required to pump all of the water out over the sides (recall that the weight density of water is 62.4 lbs. per cubic foot).

https://youtu.be/dHw-_5kXaNA

6. Re-write the series $3e + e^2 + \frac{e^3}{3} + \frac{e^4}{9} + \frac{e^5}{27} + \ldots$ in summation notation, then find the sum.

https://youtu.be/jxRqRLMliPc?t=879

7. Find the sum of the geometric series $\sum_{n=1}^{\infty}(2^{3n} \cdot 5^{1-2n})$.

https://youtu.be/jxRqRLMliPc?t=640

8. Evaluate $\int \frac{e^{x^2}}{x}\,dx$ as an infinite series.

https://youtu.be/jupmIcf1ypQ