East Los Angeles College
Department of Mathematics
Math 262
Test 3 Study Guide

Evaluate the following improper integrals.

1. $\int_1^\infty \frac{ln(x)}{x^2}\,dx$

2. $\int_0^3 \frac{1}{x\sqrt{x}}\,dx$

3. $\int_0^\infty \frac{1}{x\sqrt{x^2-4}}\,dx$

4. Show that $\int_{-\infty}^\infty \frac{1+x}{1+x^2}\,dx$ diverges, but $\lim_{t\to\infty} \int_{-t}^t \frac{1+x}{1+x^2}\,dx$ converges

5. 1. $\int_{-1}^1 \frac{e^x}{e^x-1}\,dx$

6. Determine the arc length for the following curve over the indicated interval.

$$y = \ln(cosx) \text{ for } 0 \le x \le {}^{\pi}/_{3}$$

7. Setup Simpson's rule with n=6 to estimate the arc length for the following curve.

$$y = xlnx \text{ for } 1 \le x \le 3$$

8. Find the area of the surface obtained by rotating the curve about the **x-axis**.

$$y = \frac{x^3}{6} + \frac{1}{2x} \text{ for } \frac{1}{2} \le x \le 1$$

9. Find the area of the surface obtained by rotating the curve about the **y-axis**.

$$y = \sqrt[3]{x} \text{ for } 1 \le x \le 2$$

10. Determine the length of the curve.

$$x = \frac{t}{1+t}$$
$$y = ln(1+t)$$
$$0 \le t \le 2$$

11. Determine the points where the tangent line is horizontal and vertical.

$$x = 10 - t^2$$
$$y = t^3 - 12t$$

12. Find the area bounded by the parametric curve and the x-axis.

$$x = 1 + e^t$$
$$y = t - t^2$$
$$0 \le t \le 1$$

13. Let C be the arc of a circle described by the parametric equations given.

$$x = 3\cos(t)$$
$$y = 3\sin(t)$$
$$0 \le t \le {}^{\pi}/_{3}$$

Determine the surface area by revolving C about the x-axis.

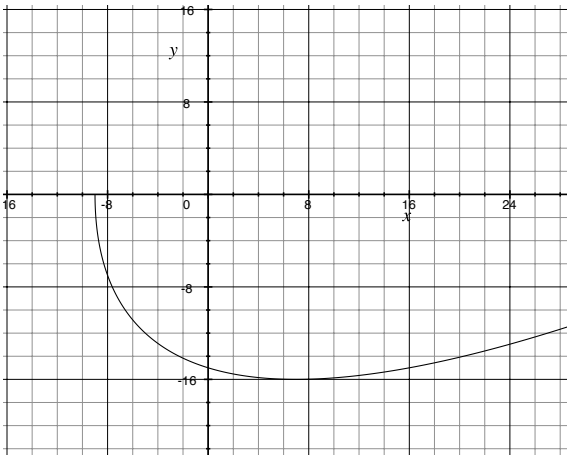
Determine the exact area of the surface by rotating the curve about the **x-axis**.

14. $x = \frac{1}{3}(y^2 + 2)^{3/2}$ over $1 \le x \le 2$

Determine the exact area of the surface by rotating the curve about the **y-axis**.

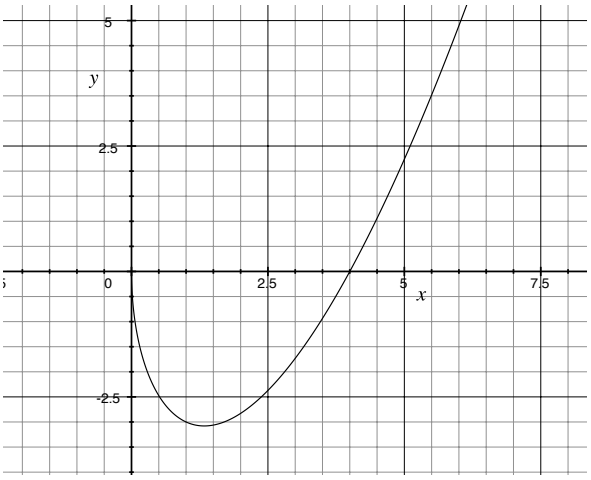
15. $x = \sqrt{4 - y^2}$ over $0 \le y \le 2$

Let $\begin{matrix} x = t^2 - 9 \\ y = t^2 - 8t \end{matrix}$ be parametric equations.

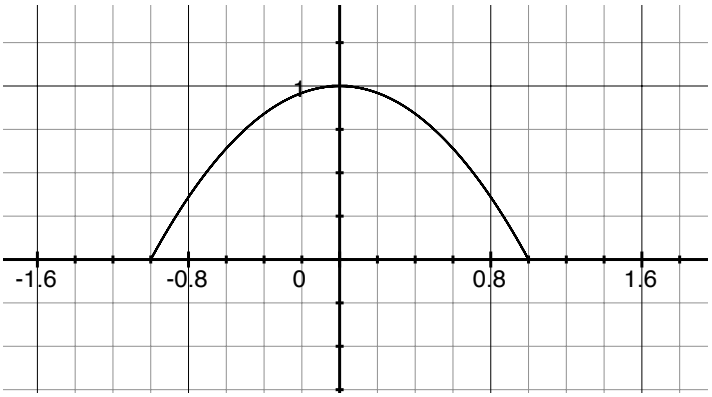


16. Draw an arrow indicating the direction of motion.
17. Find $\frac{dy}{dx}$ when $t = 4$
18. Find the equation of the tangent line when $t = 4$.
19. Find the points where the slope of the tangent line equals $\frac{1}{2}$
20. Find the points where the tangent line is horizontal.

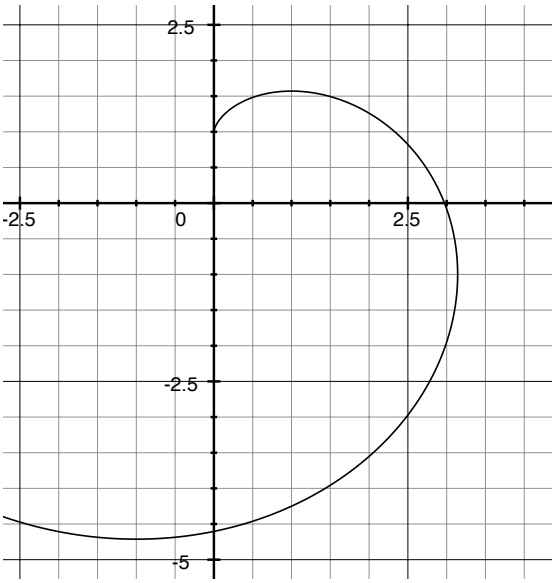
21. Let $\begin{matrix} x = t^2 \\ y = t^3 - 4t \end{matrix}$ be parametric equations. Determine the interval for t in which the curve is concave up.



22. Let $\begin{matrix} x = \sin(t) \\ y = cos^2(t) \end{matrix}$ for $0 \leq t \leq \frac{\pi}{2}$. Compute the area under the parametric curve



23. Let $\begin{matrix} x = sin(t) - tcos(t) \\ y = \cos(t) + tsin(t) \end{matrix}$ for $0 \leq t \leq 2$ be parametric equations. Determine the arc length for the curve.



24. Let $\begin{matrix} x = t \\ y = e^t \end{matrix}$ for $0 \leq t \leq 1$ be parametric equations. If you rotate the curve about the x-axis, determine the surface area generated.