EXAM 2 TMath 125 Spring 2026

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. Let $f(1) = 2$, $f(5) = -3$, $f'(1) = 4$, $f'(5) = 1$, and assume f'' is continuous.

   (a) [2] (PracticeExam2 #4) Evaluate $\displaystyle\int_1^5 6f''(x)\,dx$

   (b) [3] (WebHW7.1 #10) Evaluate $\displaystyle\int_1^5 xf''(x)\,dx$

2. [4] (OldExam2 #3 & WebHW's) For each of the following, identify the technique you would use to find the indefinite integral. For example, if you think substitution would work, write "substitution" and identify what u would be. If you think integration by parts, write "integration by parts" and identify what u and du would be.

   (a) $\displaystyle\int \frac{x^3}{\sqrt{16+x^2}}\,dx$

   (b) $\displaystyle\int \sin(5x)\sec(5x)\,dx$

3. [4] Evaluate *one* of the indefinite integrals above. Clearly indicate the work you would like considered.

4. [4] Each of the following is wrong. Find the step with the error and explain why it is wrong.

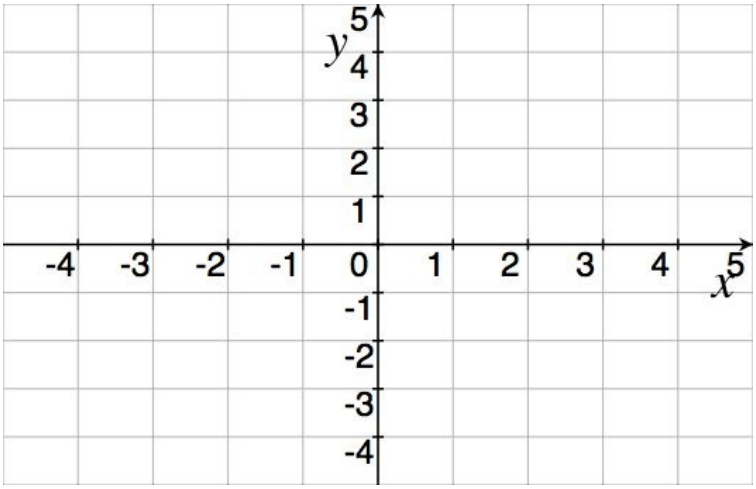
(a) $\int xe^{9x}\,dx = \frac{1}{2}x^2 \cdot \frac{1}{9}e^{9x} + C$

(b) $\int \sqrt{16 - x^2}\,dx = \int \sqrt{16 - (4\sin(x))^2}\,dx = \int 4\cos(x)\,dx = 4\sin(x) + C$

5. Consider the triangular base with the vertices: $(-1, 3)$, $(2, 1)$, and $(2, 4)$.

(a) [2] (WebHW6.2 #6)
Graph region on the axis.

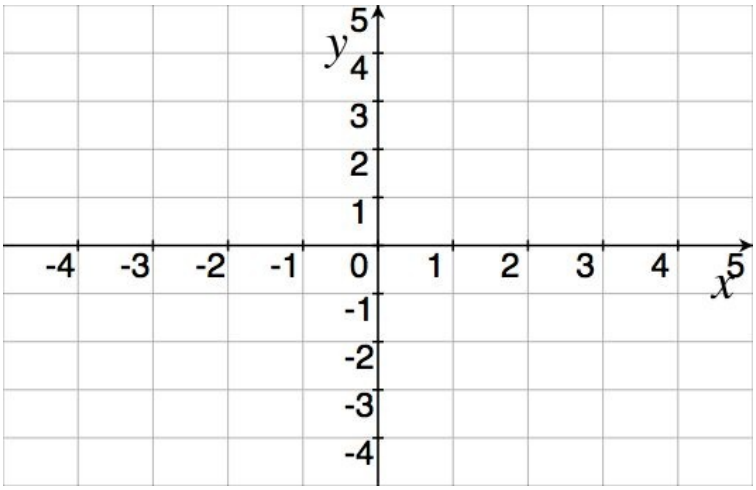
(b) [2] (§6.2 #2)
If the region in (a) was revolved around the x-axis, sketch what a typical disk would look like.



(c) [4] (WebHW5.4&5.3 #12) Set up the definite integral that would find the volume if the region in (a) was revolved around the x-axis.

6. Consider the area trapped between $\ln(x)$, $y = -1$, and $x = 4$.

   (a) [2] (WebHW6.2 #1) Graph region on the axis.

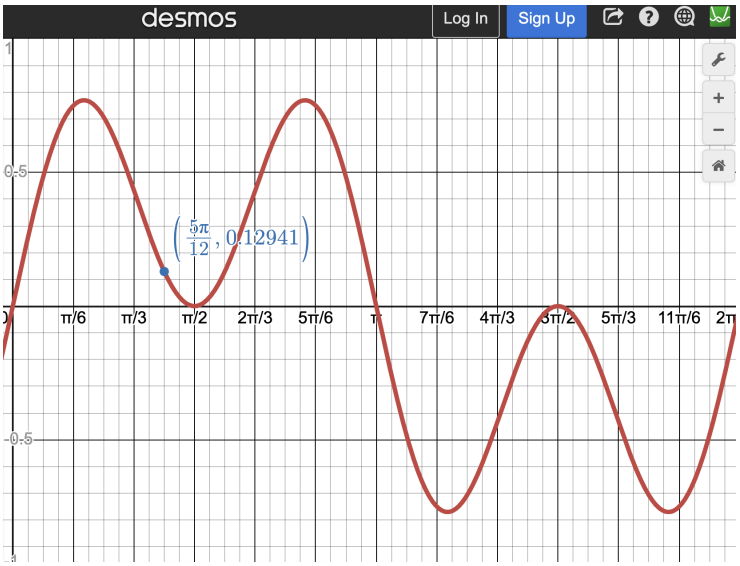
   (b) [4] (WordProblem #7) If the region in (a) was used as a base for a volume whose cross sections formed squares when cut perpendicular to the x axis. Set up the definite integral that would find the volume.

7. One problem made the substitution $3x = 6\sec(\theta)$ and then integrated to get the answer $\frac{1}{2}\sec(\theta)\tan(\theta) - \frac{1}{2}\ln|\sec(\theta) + \tan(\theta)|$.

   (a) [2] (TrigSub Activity #3) Find $\cos(\theta)$ as a function of x.

   (b) [3] (WebHW7.3 #2) Convert the answer (that is currently in terms of θ) back into terms of x.

8. A particle moves in a straight line with velocity $v(x) = \sin(x)\cos^2(x)$ (graphed below).



(a) [1] (Word Problem #1) What is the velocity when $x = \frac{5\pi}{12}$?

(b) [2] (Word Problem #1) Is the acceleration positive or negative when $x = \frac{5\pi}{12}$? Provide justification.

(c) [3] (Quiz5 #3) Find a formula for the particle's acceleration at time t.

(d) [2] Is the distance traveled positive of negative when $x = \frac{5\pi}{12}$? Provide justification.

(e) [2] Is there a time when the particle's net distance traveled is zero? Why or why not?

(f) [4] (WrittenHW7.1 #75) Find a formula for the net distance the particles has traveled in the first t seconds.