AP Calculus
Review 4B
Mr. James

Name ____________________

Date ____________________

For numbers 1–8, perform the following showing your work *neatly*.

1. $\int 2x(x^2+3)^5\,dx$

2. $\int \sec^2\theta\tan\theta\,d\theta$

3. $\int x^2(2x-1)\,dx$

4. $\int_0^2 \frac{x}{(1+x^2)^2}\,dx$

5. $\int_0^{\pi/2} \frac{\sin x}{\sqrt{\cos x}}\,dx$

6. $\int (x-3)\sqrt{x+9}\,dx$

7. $\int \sin^3 x\cos^2 x\,dx$

8. $\int \frac{x}{\sqrt{4+x^2}}\,dx$

9. $\int_1^4 \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$

10. $\int_{-1}^{1}\left(x^7+\frac{x^3}{(x^4-4)^2}\right)dx$

For numbers 11-14, find the derivative.

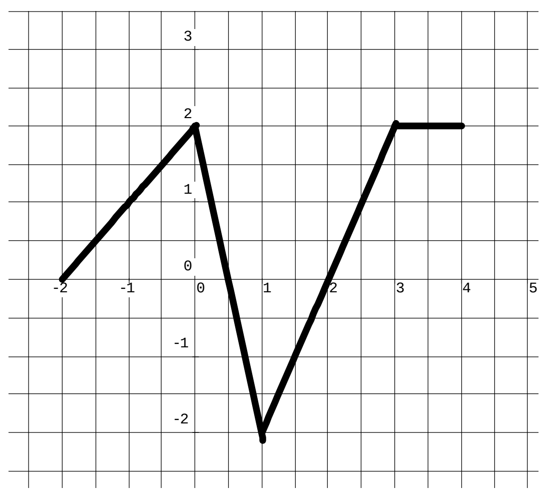
11. $\frac{d}{dx}\int_0^x \sqrt{3+\cos(t^2)}\,dt$

12. $\frac{d}{dx}\int_2^x (1+t)^{200}\,dt$

13. $\frac{d}{dx}\int_5^{x^3} \tan^{-1}(10-t)\,dt$

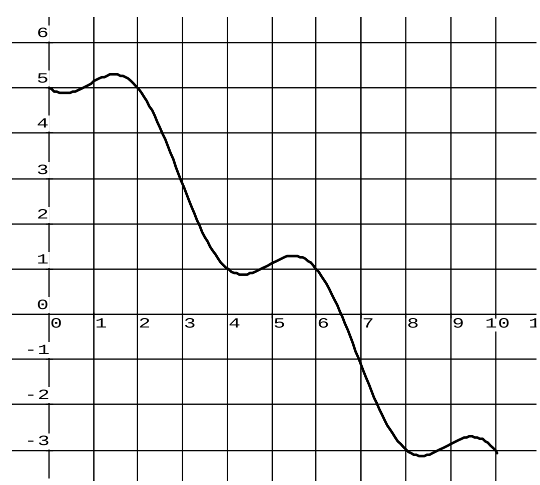
14. $\frac{d}{dx}\int_{\sin x}^{\cos x} \frac{1}{t}\,dt$

15. Let $F(x)=\int_0^{2x} f(t)\,dt$ where $f(t)$ is shown at right.



- **a.** What is the domain of $F(x)$?
- **b.** Find $F(0)$.
- **c.** Find $F(2)$.
- **d.** Find $F(-1)$
- **e.** Sketch a graph of $F(x)$ on [-1, 2] labeling all extrema (global & local) and all points of inflection.
- **f.** Write an expression for $\frac{d}{dx}F(x)$.

16. The graph at right shows the velocity of a bee in feet per *second* during a 10 minute period. Use the Trapezoid and Simpson's Rules with a partition size of 1 minute to determine the accumulated displacement of the bee relative to its starting point at $t = 0$. Compare your results with that of the Midpoint Rule with a partition size of two minutes.



17. Referring to problem number 16 above, draw a graph of the bee's position $s(t)$, as a function of time. Assume $s(2) = 0$. Locate, if possible all critical points and points of inflection in the closed interval [0, 10].