AP Calculus
Chapter 6 Review
(No Integration by Parts)

Name: _____
Block: _____

For questions 1 – 25, integrate each of the following indefinite integrals.

1. $\int \frac{3x}{\sqrt[3]{x^2+3}}\,dx$

2. $\int \sec x\,dx$

3. $\int \frac{x-1}{x+1}\,dx$

4. $\int \sin x\,dx$

5. $\int b^{4x}\,dx$
where b is a constant

6. $\int \tan x\,dx$

7. $\int \cot^2 x\,dx$

8. $\int \frac{(x+1)^2}{x^{1/3}}\,dx$

9. $\int \cos^2 x\,dx$

10. $\int \frac{dx}{4+9x^2}$

11. $\int \cos t\,dt$

12. $\int (\cos t - \sin t)^2\,dt$

13. $\int \sin^2 x\,dx$

14. $\int \frac{dx}{x\sqrt{x^2-4}}$

15. $\int \cot x\,dx$

16. $\int \csc x\,dx$

17. $\int \sqrt{x}(3-4x)\,dx$

18. $\int \frac{dx}{\sqrt{-x^2-2x}}$

19. $\int \tan^2 x\,dx$

20. $\int \frac{e^x}{\sqrt{1-e^{2x}}}\,dx$

21. $\int \csc^2 x\,dx$

22. $\int xe^{-x^2+3}\,dx$

23. $\int \sec^2 x\,dx$

24. $\int \frac{3+x}{x^2+1}\,dx$

25. DERIVE (SHOW EVERY STEP) $y = y_0 e^{kt}$ from $\frac{dy}{dt} = ky$ and $y(0) = y_0$. [Should be on your notecards!]

26. Let f be a function with $f(1) = 4$ such that for all points (x, y) on the graph of f the slope is given by $\frac{3x^2+1}{2y}$.

a) Find the slope of the graph of f at the point where $x = 1$.

b) Write an equation for the line tangent to the graph of f at $x = 1$ and use it to approximate $f(1.2)$

c) Find $f(x)$ by solving the separable differential equation $\frac{dy}{dx} = \frac{3x^2+1}{2y}$ with the initial condition $f(1) = 4$.

d) Use your solution from part *c* to find $f(1.2)$

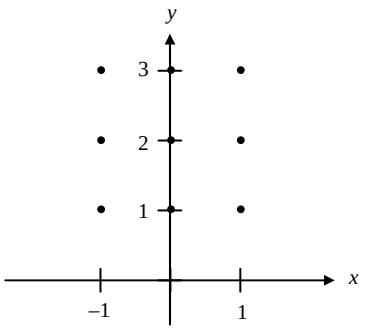
27. If $\frac{dy}{dx} = y\sec^2 x\,dx$ and $y = 5$ when $x = 0$, then $y =$

A $e^{\tan x} + 4$
B $e^{\tan x} + 5$
C $5e^{\tan x}$
D $\tan x + 5$
E $\tan x + 5e^x$

28. Consider the differential equation given by $\frac{dy}{dx} = \frac{xy}{2}$.

a) On the axes provided below, sketch a slope field for the given differential equation at the nine points indicated.

b) Draw a particular solution if $f(0) = 3$



c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$. Use your solution to find $f(0.2)$.

29. Complete the following questions from your textbook:
page 349: #2
page 373: #5, 7, 11, 13, 15, 17, 25, 27, 29, 31, 37, 38, 39, 57
page 376: #68, 69