AB Calculus: WKS on Integrating with Inverse Trig name ________________________

Work the following on **notebook paper.**

Evaluate. (Some problems involve inverse trig functions. Others are old types.)

1. $\int \frac{dx}{\sqrt{25-x^2}}$

2. $\int \frac{dx}{49+x^2}$

3. $\int \frac{x\,dx}{49+x^2}$

4. $\int \frac{x^2\,dx}{49+x^2}$

5. $\int \frac{dx}{x\sqrt{x^2-9}}$

6. $\int_0^2 \frac{dx}{4+x^2}$

7. $\int_{1/2}^{1} \frac{dx}{\sqrt{1-x^2}}$

8. $\int \frac{6x^3+25x+3}{x^2+4}\,dx$

9. $\int_0^3 e^{-2x}\,dx$

10. $\int_{\pi/8}^{\pi/6} \cos(2x)\,dx$

11. $\int_{\pi/12}^{\pi/9} \sin(3x)\cos^2(3x)\,dx$

12. $\int_0^4 \frac{x}{\sqrt{9+x^2}}\,dx$

13. $\int_0^4 \frac{5}{3x+1}\,dx$

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

15. $\int_0^2 \frac{e^{3x}}{1+e^{3x}}\,dx$

16. $\int_e^{e^3} \frac{(\ln x+2)^3}{x}\,dx$

17.

t (minutes)	0	2	5	9	10
$H(t)$ (degrees Celsius)	66	60	52	44	43

As a pot of tea cools, the temperature of the tea is modeled by a differentiable function H for $0 \le t \le 10$, where time t is measured in minutes and temperature $H(t)$ is measured in degrees Celsius. Values of $H(t)$ at selected values of time t are shown in the table above.

(a) Use the data in the table to approximate the rate at which the temperature of the tea is changing at time $t = 3.5$. Show the computations that lead to your answer.

(b) Using correct units, explain the meaning of $\frac{1}{10}\int_0^{10} H(t)\,dt$ in the context of this problem. Use a trapezoidal sum with the four subintervals indicated by the table to estimate $\frac{1}{10}\int_0^{10} H(t)\,dt$.

(c) Evaluate $\int_0^{10} H'(t)\,dt$. Using correct units, explain the meaning of the expression in the context of this problem.

(d) At time $t = 0$, biscuits with temperature 100°C were removed from an oven. The temperature of the biscuits at time t is modeled by a differentiable function B for which it is known that $B'(t) = -13.84e^{-0.173t}$. Using the given models, at time $t = 10$, how much cooler are the biscuits than the tea?