Name SHS Calculus Test 5 Review Fall 2014 Date

You must show all work to receive credit.

For problems 1-3, use the Fundamental Theorem of Calculus to evaluate the integral (3pts each).

1. $\int_2^7 x^2\,dx$ $\quad \frac{1}{3}x^3\Big]_2^7 = \frac{1}{3}(7)^3 - \frac{1}{3}(2)^3 = 335/3$

2. $\int_{-\pi}^{\pi}(5\cos x + 4\sin x)\,dx = 5\sin x - 4\cos x\Big]_{-\pi}^{\pi} = 0$

3. $\int_0^3 3x^2 - 2x + 1\,dx = x^3 - x^2 + x\Big]_0^3 = 21$

For Problems 4-6, suppose that $\int_3^7 f(x)dx = 8$, $\int_3^{11} f(x)dx = 27$, and $\int_3^{11} g(x)dx = 36$ (3pts each).

4. Find $\int_7^3 f(x)\,dx$. -8

5. Find $\int_7^{11} f(x)\,dx$. $27 - 8 = 19$

6. Find $\int_3^{11}\left[f(x) - g(x)\right]dx$. $27 - 36 = -9$

For Problems 7-8, let $f(x) = x^2 + 3$ on [1,5]. (3pts each).

7. Using a <u>left</u> hand Riemann sum with 4 equal subintervals, approximate F(x). Does this Riemann sum overestimate or underestimate F(x)? Give a reason for your answer.

$1\cdot f(1) + 1\cdot f(2) + 1\cdot f(3) + 1\cdot f(4)$
$1\cdot 4 + 1\cdot 7 + 1\cdot 12 + 1\cdot 19 = 42$

under since $f'(x)$ is strictly increasing & we used a LHS

8. Evaluate F(x) exactly using the fundamental theorem of calculus. $\int_1^5 x^2 + 3\,dx = 53\frac{1}{3}$

For questions 9-10, find the derivative. (3pts each).

9. Find A'(x) where $A(x) = \int_3^x \sin(t^3)\,dt$ $\quad A'(x) = \sin(x^3)\cdot \underline{1}$

10. G'(x) where $G(x) = \int_{-2}^{\sin(x)}(t^3)\,dt$ $\quad G'(x) = (\sin x)^3 \cdot \underline{\cos x}$

Name SHS Calculus Test 5 Review Fall 2014 Date

For questions 11-15, evaluate the integral. (4pts each).

11. $\int \frac{x^4-3x^2+1}{x^2}\,dx$

$\int x^2-3+x^{-2}\,dx = \frac{1}{3}x^3-3x-x^{-1}+C$

12. $\int x(x^3-4x)\quad dx$

$\int x^4-4x^2 = \frac{1}{5}x^5-\frac{4}{3}x^3+C$

13. $\int -4\tan^3 x\cdot\sec^2 x\,dx$

$u=\tan x$
$du=\sec^2 x\,dx$ $\quad \int -4u^3\,du = -4\cdot\frac{1}{4}(\tan x)^4+C$

14. $\frac{1}{2}\int 2x\cdot\sqrt[4]{x^2-6}\quad dt$

$u=x^2-6$
$du=2x\,dx$ $\quad \frac{1}{2}\int u^{1/4}\,du = \frac{1}{2}\cdot\frac{4}{5}(x^2-6)^{5/4}+C$

$2/5\,(x^2-6)^{5/4}+C$

15. $\int_0^4 x^3-3x^2+2\,dx$

$\frac{1}{4}x^4-x^3+2x\Big]_0^4 = \left[\frac{1}{4}(4)^4-(4)^3+2(4)\right]-[0]=8$

16. Find f(x) where $f''(x) = x^3-x^2$ with f '(2) = –1, and f(1) = 3. (6pts)

$\int x^3-x^2\,dx = \frac{1}{4}x^4-\frac{1}{3}x^3+C$ $\qquad \int \frac{1}{4}x^4-1/3x^3-7/3\,dx$

$1/4(2)^4-1/3(2)^3+C=-1$ $\qquad 1/20x^5-1/12x^4-7/3x+C$

$C=-7/3$

Also, **LOOK** at the lab we did concerning Riemann Sums. $\quad 1/20(1)^5-1/12(1)^4-7/3(1)+C=3$

$C=161/30$

so $f'(x)=1/4x^4-1/3x-7/3$

$f(x)=1/20x^5-1/12x^4-7/3x+161/30$