Honors Math 182 Homework 5 Version A

1. Find the following limits:

    (i) $\displaystyle\lim_{x\to 3+}\sin\pi x$

    (ii) $\displaystyle\lim_{x\to 3+}\frac{\sin\pi x}{x-3}$

    (iii) $\displaystyle\lim_{x\to 3-}\cos\pi x$

    (iv) $\displaystyle\lim_{x\to 3-}\frac{\cos\pi x}{x-3}$

2. Find the following antiderivatives:

    (i) $\displaystyle\int x\sqrt{4+x^4}\,dx$

    (ii) $\displaystyle\int 2^{\sqrt{x}}\,dx$

    (iii) $\displaystyle\int\frac{2x^2+7x-1}{x^3+x^2-x-1}\,dx$

    (iv) $\displaystyle\int\frac{x^2+1}{x+4}\,dx$

3. Let $f(x)=\dfrac{1}{3-\sqrt{2x-5}}$.

    (i) Find the domain of all x such that $f(x)$ makes sense and is a real value.

    (ii) Find the derivative $f'(x)$.

    (iii) Find the antiderivative $\displaystyle\int f(x)\,dx$

    (iv) Find the limit $\displaystyle\lim_{b\to 7-}\int_5^b f(x)\,dx$

4. Substitute $u=\arctan x$ in the following integrals, but DO NOT SOLVE THEM!

    (i) $\displaystyle\int_0^1 \arctan x\,dx$

    (ii) $\displaystyle\int_0^{\sqrt{3}} \arctan\sqrt{x}\,dx$

5. Define
$$S(x)=\int_0^x \sin(t^2)\,dt \qquad\text{and}\qquad C(x)=\int_0^x \cos(t^2)\,dt$$
Find the following derivatives. Your answer may include the functions S and C.

    (i) $\dfrac{d}{dx}\dfrac{S(x^2)}{C(x)}$

    (ii) $\dfrac{d}{dx}(S\circ C)(2x)$

6. Let $f(t)=\cosh(t)$ and $g(t)=t$.

    (i) Find the length of the curve given by $\big(f(t),g(t)\big)$ where $0\le t\le 2$.

    (ii) Find the surface area given by revolving the curve $\big(f(t),g(t)\big)$ where $0\le t\le 2$ about the y-axis.

    (iii) Find the surface area given by revolving the curve $\big(f(t),g(t)\big)$ where $0\le t\le 2$ about the x-axis.