Math 230, Calculus II, Spring 2016 Name:

Recall the anti-derivative of $f(x) = ax^n$ is $F(x) = \frac{ax^{n+1}}{n+1}$.
Write your final answer on the line given. Attach **ALL** work (on loose-leaf paper) to the back of this worksheet.

1. Find the general anti-derivative $F(x)$ to the following functions

   (a) $f(x) = 4x + 7 - \frac{10}{x^9}$ $F(x) =$ ____________________

   (b) $f(\theta) = 3\cos(\theta) - 4\sin(\theta)$ $F(\theta) =$ ____________________

   (c) $f(x) = 8\sqrt{x} - \sec(x)\tan(x)$ $F(x) =$ ____________________

   (d) $f(x) = 7x^{2/5} + 9x^{-1/5}$ $F(x) =$ ____________________

2. Another way to ask for the anti-derivative of $f(x)$ is to use the indefinite integral $\int f(x)\,dx$

   (a) $\int x^{1.3} + 7x^{2.5}\,dx$ = ____________________

   (b) $\int \sqrt[4]{x^5} - 3x^3\,dx$ = ____________________

   (c) $\int (x+4)(2x-1)\,dx$ = ____________________

   (d) $\int \frac{1+\sqrt{x}+x}{\sqrt{x}}\,dx$ = ____________________

   (e) $\int \frac{1-\cos^3(\theta)}{\cos^2(\theta)}\,d\theta$ = ____________________

3. We also have definite integrals: $\int_a^b f(x)\,dx = F(x)\big|_a^b = F(b) - F(a)$

   (a) $\int_{-2}^{3} x^3 - 3x + 7\,dx$ = ____________________

   (b) $\int_0^{\pi} 4\sin(\theta) - 3\cos(\theta)\,d\theta$ = ____________________

   (c) $\int_1^2 \frac{1}{x^2} + \frac{4}{x^3}\,dx$ = ____________________

   (d) $\int_{\pi/6}^{\pi/2} \csc(x)\cot(x)\,dx$ = ____________________

4. The last section we covered was integration by substitution. Given $\int f(g(x))g'(x)\,dx$, use the following substitution $u = g(x)$ and $du = g'(x)\,dx$.

$$\int f(g(x))g'(x)\,dx = \int f(u)\,du$$

(a) $\int 3x^2(x^3+4)^5\ dx$

$u =$ ____________________

$du =$ ____________________

Answer: ____________________

(b) $\int \sqrt{4x-5}dx$

$u =$ ____________________

$du =$ ____________________

Answer: ____________________

(c) $\int \frac{x}{\sqrt{x^2+1}}\ dx$

$u =$ ____________________

$du =$ ____________________

Answer: ____________________

5. When evaluating a definite integral using substitution you must also change your bounds a and b to $g(a)$ and $g(b)$

$$\int_a^b f(g(x))g'(x)\ dx = \int_{g(a)}^{g(b)} f(u)\ du$$

(a) $\int_1^2 \frac{2}{x^2}\left(1+\frac{1}{x}\right)^3\ dx$ $=$ ____________________

(b) $\int_0^{\pi/6} 4\tan(\theta)\sec^2(\theta)\ d\theta$ $=$ ____________________