Integrals — Power rule

Name: _____ Date: _____

Raise each power by one and divide by the new power. Don't forget + C.

1. $\int (-2x + 3)\,dx$

$= -\frac{2x^2}{2} + 3x + C$

$= -x^2 + 3x + C$

2. $\int (6x - 2)\,dx$

3. $\int (-2x - 1)\,dx$

4. $\int (4x - 1)\,dx$

5. $\int (4x - 3)\,dx$

6. $\int (2x - 3)\,dx$

Integrals — Definite

Name: _____ Date: _____

Find the antiderivative, then take its value at the bottom from the top.

1. $\int_{-2}^{2} (2x)\,dx$

   $= [x^2]_{-2}^{2}$
   $= ((2)^2) - ((-2)^2)$
   $= 4 - 4$
   $= 0$

2. $\int_{-2}^{1} (4x + 1)\,dx$

3. $\int_{1}^{2} (-2x + 1)\,dx$

4. $\int_{-2}^{0} (-4x)\,dx$

5. $\int_{-1}^{2} (-2x + 1)\,dx$

6. $\int_{0}^{1} (4x + 1)\,dx$

Integrals — Substitution

Name: _____ Date: _____

Find each integral by substitution: let u be the bracket.

1. $\int 8(2x + 3)^3 \, dx$

   $u = 2x + 3$, $du = 2 \, dx$
   $= \int 4u^3 \, du$
   $= u^4 + C$
   $= (2x + 3)^4 + C$

2. $\int 3(x + 3)^2 \, dx$

3. $\int 9(3x - 1)^2 \, dx$

4. $\int 8(2x - 1)^3 \, dx$

5. $\int 9(3x - 2)^2 \, dx$

6. $\int -8(-2x - 3)^3 \, dx$

Name: _____ Date: _____

Find each integral. Use the integral of each function, and divide by what the inside multiplies x by.

1. $\int (\cos x + \frac{1}{x})\, dx$

   $= \sin x + \ln|x| + C$

2. $\int (-4 \cos x - 2 \sin x - \frac{1}{x})\, dx$

3. $\int (2 \cos x + 3 \sin x)\, dx$

4. $\int (2 \cos x + 2e^x)\, dx$

5. $\int (2 \sin x + e^x + \frac{5}{x})\, dx$

6. $\int (-4 \cos x - \frac{1}{x})\, dx$

Integrals — By parts

Name: _____ Date: _____

Find each integral by parts: $\int u\,dv = uv - \int v\,du$.

1. $\int -x \sin x\,dx$

   $u = -x$, $dv = \sin x\,dx$
   $du = -dx$, $v = -\cos x$
   $= x \cos x - \int \cos x\,dx$
   $= x \cos x - \sin x + C$

2. $\int 4xe^x\,dx$

3. $\int 3x \cos x\,dx$

4. $\int -2x \sin x\,dx$

5. $\int 4x \cos x\,dx$

6. $\int -4xe^x\,dx$

Power Pack · Integration — Answer key

The power rule backwards

1. $\int(-2x + 3)\,dx = -x^2 + 3x + C$
2. $\int(6x - 2)\,dx = 3x^2 - 2x + C$
3. $\int(-2x - 1)\,dx = -x^2 - x + C$
4. $\int(4x - 1)\,dx = 2x^2 - x + C$
5. $\int(4x - 3)\,dx = 2x^2 - 3x + C$
6. $\int(2x - 3)\,dx = x^2 - 3x + C$

Definite integrals

1. $\int$ from -2 to 2 of $(2x)\,dx = 0$
2. $\int$ from -2 to 1 of $(4x + 1)\,dx = -3$
3. $\int$ from 1 to 2 of $(-2x + 1)\,dx = -2$
4. $\int$ from -2 to 0 of $(-4x)\,dx = 8$
5. $\int$ from -1 to 2 of $(-2x + 1)\,dx = 0$
6. $\int$ from 0 to 1 of $(4x + 1)\,dx = 3$

By substitution

1. $\int 8(2x + 3)^3\,dx = (2x + 3)^4 + C$
2. $\int 3(x + 3)^2\,dx = (x + 3)^3 + C$
3. $\int 9(3x - 1)^2\,dx = (3x - 1)^3 + C$
4. $\int 8(2x - 1)^3\,dx = (2x - 1)^4 + C$
5. $\int 9(3x - 2)^2\,dx = (3x - 2)^3 + C$
6. $\int -8(-2x - 3)^3\,dx = (-2x - 3)^4 + C$

sin, cos, e^x and 1/x

1. $\int (\cos x + 1/x)\,dx = \sin x + \ln|x| + C$
2. $\int (-4\cos x - 2\sin x - 1/x)\,dx = -4\sin x + 2\cos x - \ln|x| + C$
3. $\int (2\cos x + 3\sin x)\,dx = 2\sin x - 3\cos x + C$
4. $\int (2\cos x + 2e^x)\,dx = 2\sin x + 2e^x + C$
5. $\int (2\sin x + e^x + 5/x)\,dx = -2\cos x + e^x + 5\ln|x| + C$
6. $\int (-4\cos x - 1/x)\,dx = -4\sin x - \ln|x| + C$

By parts

1. $\int -x\sin x\,dx = x\cos x - \sin x + C$
2. $\int 4xe^x\,dx = 4xe^x - 4e^x + C$
3. $\int 3x\cos x\,dx = 3x\sin x + 3\cos x + C$
4. $\int -2x\sin x\,dx = 2x\cos x - 2\sin x + C$
5. $\int 4x\cos x\,dx = 4x\sin x + 4\cos x + C$
6. $\int -4xe^x\,dx = -4xe^x + 4e^x + C$