

Name _____ Score _____ Teacher _____ Date _____

Trigonometric Powers and Products

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

1. Evaluate integral: $2 \sin(x)^2 dx$. Hint: use power-reduction identities.

2. Evaluate integral from 0 to $\pi/4$: $2 \sec(x)^1 \tan(x)^3 dx$. Hint: save $\sec(x)\tan(x) dx$.

Name _____ Score _____ Teacher _____ Date _____

Trigonometric Powers and Products

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

3. Evaluate integral: $3 \sin(x)^3 \cos(x)^2 dx$. Hint: save one $\sin(x)$ dx.

4. Evaluate integral from 0 to $\pi/4$: $5 \sec(x)^4 \tan(x)^4 dx$. Hint: save $\sec(x)^2 dx$.

Name _____ Score _____ Teacher _____ Date _____

Trigonometric Powers and Products

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

5. Evaluate integral: $5 \sec(x)^3 \tan(x)^3 dx$. Hint: save $\sec(x)\tan(x)$ dx.

6. Evaluate integral from 0 to $\pi/4$: $4 \sec(x)^4 \tan(x)^2 dx$. Hint: save $\sec(x)^2 dx$.

Trigonometric Powers and Products

Worked Answer Key

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

- 1. Evaluate integral: $2 \sin(x)^2 dx$. Hint: use power-reduction identities.**

Answer: $1x - 1/2 \sin(2x) + C$

1. Power reduction changes the integrand to $2/2 (1 - \cos(2x))$.
2. Integrate term by term to obtain $1x - 1/2 \sin(2x) + C$.
3. The constant of integration is included.

- 2. Evaluate integral from 0 to $\pi/4$: $2 \sec(x)^1 \tan(x)^3 dx$. Hint: save $\sec(x)\tan(x) dx$.**

Answer: $-2/3\sqrt{2} + 4/3$

1. Save $\sec(x)\tan(x) dx$ and use $\tan(x)^2 = (\sec(x)^2 - 1)^1$.
2. With $u = \sec(x)$: $2 \int u^0(u^2 - 1)^1 du$.
3. Evaluate $-2 u^1 + 2/3 u^3$ at $u = 1$ and $\sqrt{2}$: $-2/3\sqrt{2} + 4/3$.

Name _____ Score _____ Teacher _____ Date _____

Trigonometric Powers and Products

Worked Answer Key

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

3. Evaluate integral: $3 \sin(x)^3 \cos(x)^2 dx$. Hint: save one $\sin(x) dx$.

Answer: $-(1 \cos(x)^3 - 3/5 \cos(x)^5) + C$

1. Save $\sin(x) dx$ and rewrite the integrand as $3(1-\cos(x)^2)^1 \cos(x)^2 \sin(x) dx$.
2. With $u = \cos(x)$, $du = -\sin(x) dx$: $-3 \int (1-u^2)^1 u^2 du$.
3. Expand and integrate, then substitute back: $-(1 \cos(x)^3 - 3/5 \cos(x)^5) + C$.

4. Evaluate integral from 0 to $\pi/4$: $5 \sec(x)^4 \tan(x)^4 dx$. Hint: save $\sec(x)^2 dx$.

Answer: $12/7$

1. Save $\sec(x)^2 dx$ and rewrite the other 2 secant powers as $(1+\tan(x)^2)^1$.
2. With $u = \tan(x)$: $5 \int u^4 (1+u^2)^1 du$.
3. Evaluate $1 u^5 + 5/7 u^7$ from 0 to 1: $12/7$.

Trigonometric Powers and Products

Worked Answer Key

Choose an identity from the parity pattern, show the substitution or power reduction, and give an exact antiderivative or definite value.

5. Evaluate integral: $5 \sec(x)^3 \tan(x)^3 dx$. Hint: save $\sec(x)\tan(x) dx$.

Answer: $-\frac{5}{3} \sec(x)^3 + \frac{1}{5} \sec(x)^5 + C$

1. Save $\sec(x)\tan(x) dx$ and use $\tan(x)^2 = (\sec(x)^2 - 1)^1$.
2. With $u = \sec(x)$: $5 \int u^2(u^2 - 1)^1 du$.
3. Expand and integrate: $-\frac{5}{3} \sec(x)^3 + \frac{1}{5} \sec(x)^5 + C$.

6. Evaluate integral from 0 to $\pi/4$: $4 \sec(x)^4 \tan(x)^2 dx$. Hint: save $\sec(x)^2 dx$.

Answer: $32/15$

1. Save $\sec(x)^2 dx$ and rewrite the other 2 secant powers as $(1 + \tan(x)^2)^1$.
2. With $u = \tan(x)$: $4 \int u^2(1 + u^2)^1 du$.
3. Evaluate $\frac{4}{3} u^3 + \frac{4}{5} u^5$ from 0 to 1: $32/15$.