SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Evaluate the integral.

1) $\int x^6(x^7 - 4)^4 \, dx$ 1) _____

2) $\int \frac{dx}{x \ln x^4}$ 2) _____

(1)

$u = x^7 - 4$

$du = 7x^6$

$\frac{1}{7} du = x^6 dx$

$\frac{1}{7} \int u^4 \, du$

$= \frac{1}{7} \left(\frac{1}{5} u^5 \right) + C$

$= \frac{1}{35} (x^7 - 4)^5 + C$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Evaluate the integral.

1) $\int x^6(x^7 - 4)^4 \, dx$ 1) _____

2) $\int \frac{1 \, dx}{x \ln x^4}$ 2) _____

(2) $u = \ln x$

$du = \frac{1}{x} dx$

$= \int \frac{1 \, dx}{4x \ln x} = \frac{1}{4} \int \frac{dx}{x \ln x} = \frac{1}{4} \int \frac{1}{u} du$

$= \frac{1}{4} \ln|u| + C = \frac{1}{4} \ln|\ln x| + C.$

Evaluate the definite integral.

3) $\int_0^{\pi/2} x^2 \sin 3x \, dx$

Give your answer in exact form.

3) _____

$F(b) - F(a)$

u	dv
x^2	$\sin 3x$
$2x$	$-\frac{1}{3}\cos 3x$
2	$-\frac{1}{9}\sin 3x$
0	$\frac{1}{27}\cos 3x$

$-\frac{1}{3}x^2\cos 3x + \frac{2}{9}x\sin 3x + \frac{2}{27}\cos 3x$

$$\left[-\frac{1}{3}\left(\frac{\pi}{2}\right)^2 \cos\left(\frac{3\pi}{2}\right) + \frac{2}{9}\left(\frac{\pi}{2}\right)\sin\left(\frac{3\pi}{2}\right) + \frac{2}{27}\cos\left(\frac{3\pi}{2}\right) \right]_0^{\frac{\pi}{2}} - \left(0 + 0 + \frac{2}{27}\cos 0\right)$$

$-\frac{\pi}{9}$ $-\frac{2}{27}$

(5) $\int dy = 22\int \left(\frac{1}{x}\,dx\right)$

$y = 22\ln|x| + C$

$21 = 22\ln|1| + C \qquad C = 21$

$21 = 22(0) + C$

$\ln 1 = x$

$e^x = 1$

$x = 0$

Use separation of variables to solve the initial value problem.

5) $\frac{dy}{dx} = \frac{22}{x}$ and $y = 21$ when $x = 1$

5) $y = 22\ln x + 21$

6) $y' = \frac{5x^2}{\sqrt{y}}$ and $y = 1$ when $x = 0$

6) _____

(6) $y' = \frac{dy}{dx}$ $\quad \frac{1}{2} + 1 = \frac{1}{2} + \frac{2}{2}$

$\int (y)^{\frac{1}{2}} dy = \int 5x^2 dx$ $\quad$ SO...

$\frac{2}{3} y^{\frac{3}{2}} = \frac{5}{3} x^3 + C$ $\quad \frac{2}{3}(1)^{\frac{3}{2}} = \frac{5}{3}(0)^3 + C$

$\frac{2}{3} = C$

$3\left(\frac{2}{3} y^{\frac{3}{2}} = \frac{5}{3} x^3 + \frac{2}{3}\right)$

$\frac{2y^{\frac{3}{2}}}{2} = \frac{5x^3 + 2}{2}$

$\left(y^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left(\frac{5x^3+2}{2}\right)^{\frac{2}{3}}$

$y = \left(\frac{5x^3+2}{2}\right)^{\frac{2}{3}}$