Here we list final answers to some or all homework problems so that you can check your answers against them. However, in most cases we DO NOT show all the work necessary to obtain the answer. In your homework and on quizzes/exams you need to carefully show all the necessary work to get the answer.

**Solutions Day 1:**

2. (a) \(-15\)  \(\text{(b) }\frac{93}{8}\)  \(\text{(c) }4\)  \(\text{(d) }\frac{3y^5}{8x}\)  \(\text{(e) }\frac{y^2}{x^2 + y^2}\)  \(\text{(f) }\frac{x-7}{2-x}\)

\[\text{(g) }\frac{3(3x-1)}{(x+3)(3x+1)}\]  \(\text{(h) }\frac{2(1+x^2)}{\sqrt{2+x^2}}\)  \(\text{(i) }-3x^2 + \frac{4}{x^2 + 1}\)

3. Answers in back of book

4. Here we write out solution (a) showing all work, as you are expected to do it. We write out a couple of other solutions for you to check. However, you can check all indefinite integrals yourself, by confirming that the derivative of your result is the integrand. You should practice checking your own result.

(a) Let \(u = x^2\). Then \(du = 2x \, dx\). It follows that \(x \, dx = \frac{1}{2} \, du\). Writing the integral in terms of \(u\) obtain:
\[
\int x \sin(x^2) \, dx = \frac{1}{2} \int \sin(u) \, du = -\frac{1}{2} \cos(u) + C = -\frac{1}{2} \cos(x^2) + C
\]
(Remember to always write your final answer in terms of the original variables. And remember to add your constant of integration.)

(e) \(2 \sin \sqrt{t} + C\)

(g) \(-\frac{1}{3} \ln |5 - 3t| + C\) (dont forget the absolute value!)

(k) First use substitution \(u = 2x\), then use another substitution \(w = \sin(u)\).

5. \(\frac{2}{5}x^{5/2} + \frac{8}{3}x^{3/2} + 6x^{1/2} + C\)

**Solutions Day 2:**

1. (a) 10  \(\text{(c) }13/2\) (Your answers should include graph of function)

2. For (a) we show all work, as you are expected to do it. Make sure to change your integration bounds when you change variables in the integrand. You will loose points if your bounds do not correspond to the integration variable.

(a) Let \(u = t^2 + 4\). Then \(du = 2t \, dt\) and \(t \, dt = \frac{1}{2} \, du\). If \(t = 0\) then \(u = 4\). If \(t = 2\) then \(u = 8\). So
\[
\int_0^2 t\sqrt{t^2 + 4} \, dt = \frac{1}{2} \int_4^8 \sqrt{u} \, du = \frac{1}{2} \left[ \frac{2}{3}u^{3/2} \right]_4^8 = \frac{1}{3} \left[ u^{3/2} \right]_4^8
\]
\[
= \frac{1}{3} (8^{3/2} - 4^{3/2}) = \frac{1}{3} ((2\sqrt{2})^3 - 2^3) = \frac{1}{3} (8 \cdot 2\sqrt{2} - 8) = \frac{8}{3} (2\sqrt{2} - 1)
\]

(d) \(\frac{1}{3} (16 - 14\sqrt{2})\)

(g) \(-5/64\)

(j) \(\frac{1}{6} [64 - (1 + \frac{1}{\sqrt{3}})^6]\)