Math 140 Quiz #4 (Fall 2020)

1 Evaluate the integral $\int \left(\frac{1}{x^2} - \frac{2}{x^{5/2}} \right) dx$.

Using the Power Rule for integration,

$$\int \left(\frac{1}{x^2} - \frac{2}{x^{5/2}} \right) dx = -x^{-1} - 2 \cdot \frac{-2}{3} x^{-3/2} + C = -\frac{1}{x} + \frac{4}{3x^{3/2}} + C.$$

2 Evaluate the integral $\int \frac{1 + \tan\theta}{\sec\theta} \, d\theta$.

With a couple simple trigonometric identities we get

$$\int \frac{1 + \tan\theta}{\sec\theta} \, d\theta = \int (\cos\theta + \sin\theta) \, d\theta = \sin\theta - \cos\theta + C.$$

3 Using a right Riemann sum and five rectangles, approximate the area under the curve $f(x) = x^2 + 2$ between $x = 1$ and $x = 6$, rounding to the nearest hundredth if necessary.

Each rectangle would have width $\Delta x = (6-1)/5 = 1$, and the kth rectangle would have height $f(k+1)$ for integers $1 \le k \le 5$. Area estimate is

$$\sum_{k=1}^{5} f(k+1)\Delta x = \sum_{k=1}^{5} [(k+1)^2 + 2] = 6 + 11 + 18 + 27 + 38 = 100.$$

No rounding necessary.