Prof. Haiman | Math 1A—Calculus | Fall, 2006

**Quiz 11 solutions—version B**

Name ____________________ Student ID Number ____________________

1. Write down (you do not need to compute their values) two Riemann sums for the function $f(x) = \sin x$ on the interval $[0, \pi/2]$, using 5 equal subdivisions. Choose your Riemann sums so that one of them is an *upper* bound (that is, an overestimate) for the area $A$ under the curve $y = \sin x$ on the interval $[0, \pi/2]$ and the other is a *lower* bound. Be sure to say which one is which.

Since $\sin x$ is increasing on $[0, \pi/2]$, the left-endpoint Riemann sum

$$\frac{\pi \sin 0}{10} + \frac{\pi \sin \pi/10}{10} + \frac{\pi \sin 2\pi/10}{10} + \frac{\pi \sin 3\pi/10}{10} + \frac{\pi \sin 4\pi/10}{10}$$

is a lower bound for $A$. The right-endpoint Riemann sum

$$\frac{\pi \sin \pi/10}{10} + \frac{\pi \sin 2\pi/10}{10} + \frac{\pi \sin 3\pi/10}{10} + \frac{\pi \sin 4\pi/10}{10} + \frac{\pi \sin \pi/2}{10}$$

is an upper bound.

2. Find the function $F(x)$ such that $F''(x) = e^{2x}$, $F(0) = 0$, and $F'(0) = 1$.

Antidifferentiating twice, the general form of $F(x)$ is $e^{2x}/4 + Cx + D$. Setting $x = 0$ in $F(x)$ gives $D = -1/4$. Setting $x = 0$ in $F'(x) = e^{2x}/2 + C$ gives $C = 1/2$, so $F(x) = e^{2x}/4 + x/2 - 1/4$.